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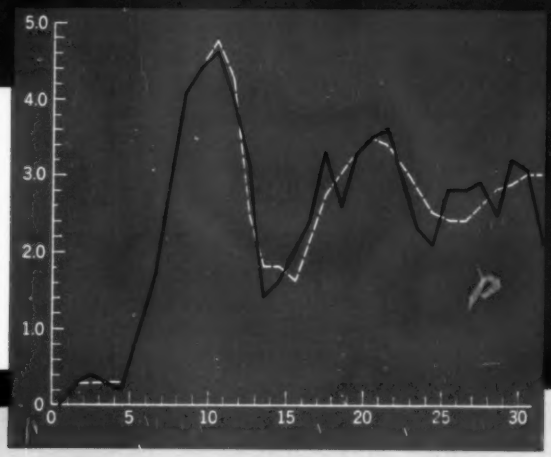
• including Punched Tape-Computers



Operations Research

page 15

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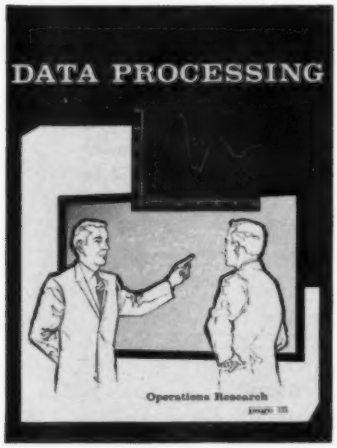

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OBSERVATIONS . . .

from the publisher . . .

OF THE MORE THAN 2000 readers who responded recently to our questionnaire on data processing operations, nearly five hundred commented on their needs and on the services presently rendered by the manufacturers, suppliers, publications and associations serving this field.

As might be expected, only a few said they were completely satisfied. When you ask for criticism you usually get it. While recognizing the great progress that has been made in recent years it is obvious there is much left to be done.

Although the comments in the questionnaires covered a vast number of subjects, the greatest number fell in four categories and are summarized here.

1. LACK OF MANAGEMENT EDUCATION

Although a great deal of selling appeal is directed to management particularly on the more "glamorous" equipment, very little is being done to educate them on the true facts and limitations with which the data processing manager has to live. Management has come to expect near-miracles of equipment and when they fail to materialize the manager too often gets the blame. The same lack of education applies to other personnel in the company whose responsibility it is to cooperate with the Data Processing department.

2. LACK OF TOTAL SYSTEMS CONCEPT

Somewhat related to the first category, many respondents indicate that too much attention is given to equipment and not enough to thorough systems planning prior to equipment procurement. Many feel that the data processing manager lacks the recognition necessary to enable him to participate in this planning. Some feel that the manufacturers and suppliers should provide the basis for this "total systems planning" since management is often hesitant to hire an outside consulting service.

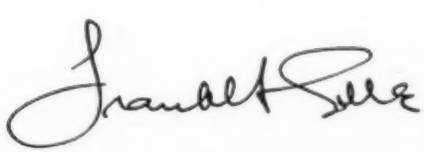
3. "INPUT-OUTPUT" DEVELOPMENTS TRAIL "MAIN FRAME"

No secret is the fact that input and output producing equipment has failed to keep pace with other equipment. Many respondents look to the manufacturers for more advanced methods of producing input as a by-product of other operations.

4. NEGLECT OF SMALL "NON-COMPUTER" USERS

Many small users express their dissatisfaction, especially with associations and publications, for their concentration

(continued on page 43)



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- MANAGEMENT GAMES USING PUNCHED CARDS AND COMPUTERS by Clifford J. Craft 17

A general, basic look at the past, present and future of Operations Research. Also, a comprehensive explanation of business simulation or management games, a recent development in the field of OR. It is intended that the reader become more keenly aware of this field and the uses to which it can be put in data processing.

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- MAGNETIC TAPE RECORDING — A PRIVATE INDUSTRIAL REVOLUTION by James L. Kamiske 8

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THE AUTHORS

CLIFFORD J. CRAFT *("Management Games Using Punched Cards and Computers")* joined Peat, Marwick, Mitchell & Co. in November, 1958 as a Manager in their Management Controls Department. Previously he was with the American Management Association as Manager of the Manufacturing Division. He also served as Manager of the Finance Division and was responsible for all meetings in the areas of operations research, electronic data processing, finance and accounting. Also, he served as Director of Special Projects and was responsible for development of the AMA Top Management Decision Simulation Game. Mr. Craft holds three patents for electronic switching inventions and has published a number of articles on electronic data processing and operations research in business and professional journals.

JAMES L. KAMISKE *("Magnetic Tape Recording Wages Private Industrial Revolution")* is Field Engineer in the magnetic products division of Minnesota Mining and Manufacturing Company, where he has been employed since 1950. He was admitted in 1956 as a registered Professional Engineer in the State of Minnesota. Mr. Kamiske attended the University of Wyoming and Stanford University before receiving his undergraduate degree in Electrical Engineering from the University of Minnesota in 1949. He received his Master's Degree from the same school the following year.

WILLIAM A. GOTHARD *("Golf Handicapping on a Computer")* is President and General Manager of Integrated Data Corporation in California. He graduated from the University of Illinois where he majored in mathematics in 1950. He is a golfer of considerable skill, his handicap is usually four or five.

G. ALAN PRICE *("Managing a Data Processing Department")* is Assistant Manager of the Machine Accounting Department at the Oakville, Ontario Assembly plant of Ford Motor Company of Canada, Limited. He joined the company in 1943, received his first supervisory appointment in 1950, the responsibility for vehicle scheduling and invoicing operations, and was appointed to his present position in 1956. Although he is called upon to develop and implement major punched card procedures, his main function has been to develop better utilization of manpower and equipment.

JOHN DIEBOLD *("Computer Census Report")* is the head of a group of management consulting companies that provide a broad, integrated range of services in the fields of modern management and management science techniques. In addition to developing this world-wide group of consulting firms, Mr. Diebold, at 33, has an international reputation as an authority on automation, particularly with its management and organization implications. He was the founder of one of the foremost magazines on the automation field, and is the author of *Automation*, one of the first books on the management implications of automation. Mr. Diebold is also originator of the word "automation" as used today.

His educational background includes an MBA degree with distinction from the Harvard Business School, an engineering degree from the United States Merchant Marine Academy, and a degree with high honors in economics from Swarthmore College.

■ ■ ■

Comments from Readers

"Rate Your Staff"

Dante, Va.

I, for one, would like you to continue the "Rate Your Staff" *(Data Processing Quiz)* feature in PC/DP. I would prefer some multiple choice questions in about the same proportion of EAM and EDPM questions as in the July/August issue.

You are producing an excellent periodical, in my opinion; therefore I was extremely happy to read that PC/DP will be published monthly during 1960.

Ralph E. Rose, Jr.
Manager, Data Processing Dept.
Clinchfield Coal Company

T'ain't Funny!

Camden, N. J.

As a charter subscriber to Punched Card/Data Processing it pains us to see you waste valuable space on such trivia as "Analytical Remarks" in the July/August issue. To classify such remarks as analytical and their author as an accomplished wit leads us to question seriously your editorial insight.

Such hackneyed attempts at hilarity are not worth two pages in a modern business publication. And the ability to laugh at one's self is not the point, although you so imply. This is sophisticated 1959; the era of the eye-winking, tongue-clucking, lip-smacking, wise-cracking drummer full of humorous (?) observations is dead some thirty years. If such corn drew even a smile from this corner, our concept of humor would demand alteration.

Please, if you're desperate for space fillers, let us know and we'll be happy to accommodate.

Joseph A. Schmid, III
Manager, Data Processing Systems
Campbell Soup Company

'T'is!

Redstone Arsenal, Ala.

The article in the July/August Data Processing titled "Analytical Remarks" is a gem. Congratulations to Mr. McLagan for handing the Systems Analyst a good laugh on themselves.

EDITH M. GIBBS
Chief
Data Processing Application Br.
Field Service Division
Army Rocket & Guided Missile Agency
Redstone Arsenal

Breaking Barriers

Hawthorne, Calif.

. . . All your articles are powerful tools for breaking down the barriers of medium and small companies toward data processing automation.

We are just starting what we call a Commercial Automation Center, with a complete line of data processing equipment. It is strongly felt that many articles published in your new magazine would work wonders in acquainting our prospective customers with data processing equipment. Would you grant us permission to duplicate and pass out all or any part of articles which we might deem applicable. *(Permission granted.)* Also, this would allow organizations who are considering switching to punched card data processing to become familiar with your excellent magazine. In fact, if it were not so expensive we would like to give each prospective customer a complimentary copy of each current issue.

Charles T. Aubrey
Vice President
Associated Aero Science Laboratories, Inc.

Programming

Augusta, Ga.

I am a Supervisory Training Officer at the Signal Training Center at Fort Gordon, Ga. During research work at our Technical Library, I have become acquainted with your magazine. One of my interests has been to learn more about the techniques of design and programming of automatic data processing equipment.

I have enjoyed reading each issue that has been published thus far. I especially enjoyed your editorial in the March/April issue about the selection of programmers . . .

Stephen E. Douglass

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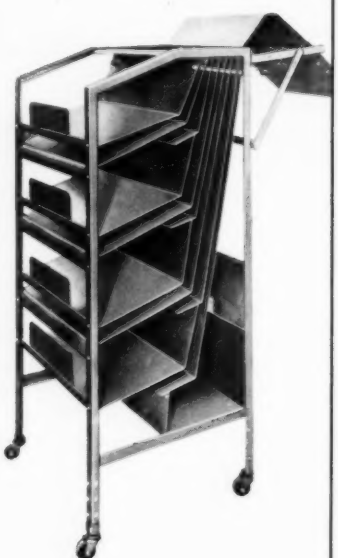
Truly, the speed and mechanical genius of the LINNET are such that no office would use any other Decollator after giving it a fair and practical trial.

SPECIFICATIONS: 22 x 22 inches or 22 x 30 inches, for 11-inch or 17-inch forms. Made of heavy sheet steel, smartly finished in gray crackle. Legs adjustable to different heights. Chute can be firmly fixed at any angle. Takes up to 5-part forms; with auxiliary rack, 6 and 7-part forms. One LINNET, set horizontally for self-decollating, can handle output of several tabulators.



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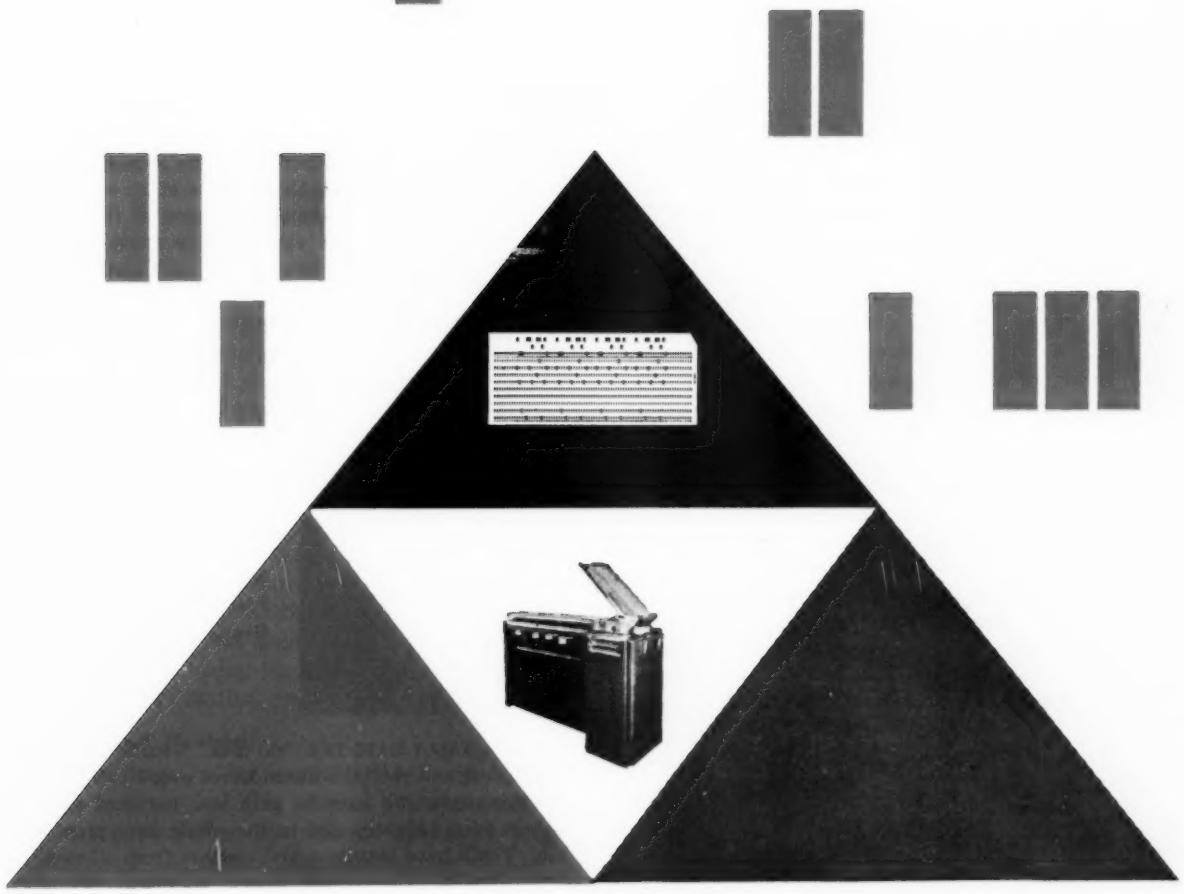

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Data Processing FORUM

QUESTION: "What Should You Expect from Your Forms?"

Carl E. Osteen
Administrative Assistant (Systems)
New York Times,
New York, New York

IF SPECIFIC FORMS do not present specific operating problems, purchasing should be responsible for insuring the automatic replenishment of supplies according to specifications and demand.

If the corporate master systems plan is not endangered, let operating personnel bear the major share of the responsibility for handling those forms problems which require revision. The elements of forms design and construction are quite simple and can be intelligently applied by most operating people with relatively little indoctrination. If the form is processed through complex equipment, the form might be correspondingly more complex but only to the extent of the limitations of the equipment.

If the total systems concept is at work, then the form becomes the *prime tool* of the systems analyst. Then it can be one of the major contributing services to the total paperwork data processing system and for this reason must come under the watchful eye of the group responsible for integrating all operations from input to output.

Stanley Miller
Director of E.D.P.,
Pharmaceuticals, Inc.,
Newark, New Jersey

THE PURPOSE OF DESIGNED FORMS is obvious and that is: "To convey information to the recipient."

The form itself must be effective as to function and simplicity. Many times it is vital to understand the nature of the recipient, and what action, if any, will be taken as a result of the data submitted.

In planning forms design, aid should be forthcoming from the forms salesman. The forms salesman should not be considered only in the position of an order-taker, but rather let him become an extension of the methods and planning group. By applying the above principles with some thoughtful planning you will *know* what to expect from your forms. Efficient conveyance of data to those concerned will be accomplished.

Douglas C. Kerrigan
President
Southern Systems and Forms, Inc.,
Greenville, South Carolina

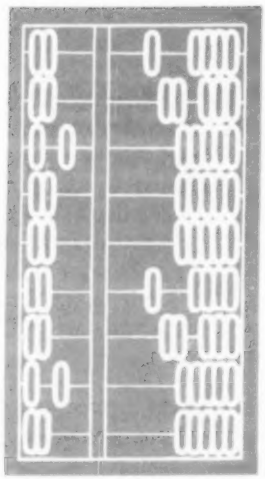
SO YOU FINALLY HAVE THE "BIG IDEA" WORKED OUT, after trial, error and retrial a dozen times over? It's original, it's ingenious, it's sure to gain you personal recognition in your industry and in the whole data processing field. You'll have inquiries and visitors from all over the place. You've always been known to run a nice clean shop before, but this is *the* deal you've worked on with loving care for a long, long time. Your procedure is sound, your hardware is the best available for the job, the floor layout is a knockout and you've got the people to do the job properly.

Know what can spoil the whole beautiful picture? Shabby, improperly laid out forms! I've seen, and perhaps you've seen, too, forms and illustrations of forms that look like they took all of six minutes to design.

Your business forms become your representatives. Your forms won't cost a penny more if they are skillfully laid out, both from the technical and from the esthetic viewpoint.

Put your forms supplier to work. If he's skilled in his field, he'll enjoy helping you work out the very best possible forms and he'll have as much pride in the finished product as you'll have.

What can you lose? Who knows, the *next* form you buy may be written up and illustrated in a national publication!



"A Feasibility Study"

THE ALPHABETIC ABACUS

By Zeph W. Shepherd

The Problem:

Increase production, reduce overhead, and install more modern equipment for data processing.

AT THE POONTANG RICE COMPANY IN INDOOR, CHINA the abacus operators carry their portable "arm-hold" models to the paddies and wade in up to their assembly and loading area. As the bags are filled and assembled they are loaded on the cart and the abacus operator tallies his total. This requires one portable abacus (*arm-hold model*) and one operator for each cart being loaded. Each abacus operator then returns to the office at the end of the shift and records the number of bags he tallied for the day. At the end of the month the abacus operators must declare one day for month-end closing, thus losing an entire day of rice loading. Invoices are mailed chop chop!

One Proposed Method:

Load the bags in the carts and have the carts pass the doorway of the abacus department. As each cart approaches, the abacus operators step out and count the number of bags on the cart.

Note: This method proved unsatisfactory since the bags had to be almost completely unloaded for accurate count and the abacus operators, unused to this heavy work, were suffering sprained backs and stained kimonas, thus pyramiding cleaning expense, absenteeism and indirectly increasing the unemployment tax rate.

Solution

A feasibility study was made to determine the advisability of having the president issue a directive to all cart loaders. After management and the labor tong leaders negotiated an agreement this was done and all cart loaders were instructed specifically to load exactly 36 bags on a cart — no more, no less. With this phase accomplished, the abacus department experienced an immediate relief from the earlier overload since it became necessary only to count carts and multiply by 36 at month-end. Only one abacus operator is now required in place of the six previous operators thus releasing five more coolies for rice picking. The portable arm-hold models were traded in for one console model with finger input and eyeball output.

Appraisal

Economies effected by the above resulted in a net saving on operating expense of 4000 tsien per month. It is anticipated that the Abacus Manufacturing Company will in the near future announce a new alphabetic model which shows promise of added economy of up to 200 yuan per month.

Editor's Note

This case history shows the very early beginning of automated data processing. However, as history has subsequently revealed, the Abacus Manufacturing Company never did announce its alphabetic model. The Chief Project Engineer was not convinced of the practicality of this particular model and since he was wed to the daughter of the Chairman of the Board, we can only hope that through future Research and Development we may some day find this project re-activated. If engineers can be found who can produce an alphabetic abacus, there will certainly be no problem in finding customers who will try to use them. ■

Magnetic Tape Recording
- A Private Industrial Revolution

By James L. Kamiske

Some Basic Properties and Developments in Magnetic Tape

A PRIVATE INDUSTRIAL REVOLUTION has been developing in recent years — the result of a reddish-brown ribbon's impact on modern technology.

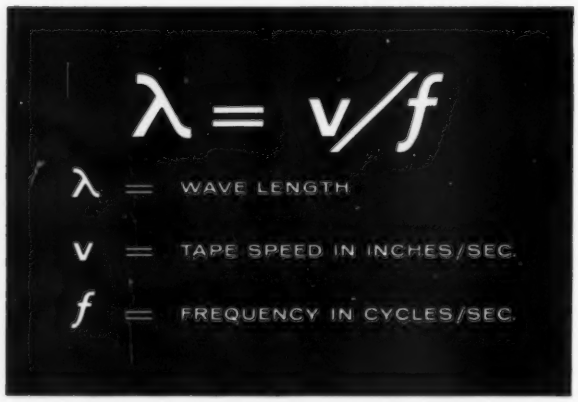
Magnetic tape is now so widely adopted throughout industry it has picked up the tag, *"pad and pencil of the electronic age."*

Digital tapes today are as well accepted as either written documents or punched cards in the data processing field. Analog tapes are rapidly replacing oscillographic records as the first-line storage medium for high-speed data acquisition. Computing systems, instrumentation systems, and machine tool control systems — in which magnetic recording tapes play key roles — are becoming commonplace.

The Introduction of Magnetic Tape

All of these developments have taken place in a remarkably short period of time. Magnetic tape — as we know it today — is only a shade more than ten years old. The introduction of red oxide magnetic tape in 1948 revolutionized the recording industry, gave radio a new lease on life, and launched the tape recorder as a key device of the electronic age.

Major advances following this development included plastic backings, lubricated binder systems, particle orientation, and high output tape constructions. All of these improvements were directed primarily toward better tape performance in the recording of sound. More recently, product improvements directly beneficial to industrial applications of magnetic recording have been achieved.



This formula shows the recorded wave length to be directly proportionate to tape speed and inversely proportionate to frequency. Special oxides with improved short wave length recording properties permit recording higher frequencies at lower speeds.

The first technical advance was made some four years ago with the introduction of *"instrumentation quality"* magnetic tapes. The importance of this development can best be understood by considering the differences that exist between typical sound recording and industrial recording situations.

Cost comparisons of home and professional equipment clearly indicate the high degree of accuracy and sensitivity required by instrumentation recorders. A standard home tape recorder costs approximately $200. Professional recorders of the type used in radio stations run about $2,000. Industrial recorders rarely sell for less than $10,000 and frequently cost several times this figure.

Marketing Requirements

The human ear is the ultimate judge of *"sound"* quality and distinguishes fine differences in audible range recording. High performance recording instruments, however, can easily detect differences well beyond the audible range. Consequently, a quality level in magnetic tape far above that required for "sound" recording is essential.

Some irregularities are not significant in sound recording work, since the output variations are too small to be detected by the human ear. High performance recorders, on the other hand, *are* sensitive to defects of this nature.

Tape defects or *"dropouts"* of one type are virtually eliminated in *"instrumentation quality"* tapes. This is due in large measure to engineering advances in tape coating machines. Dust control measures in coating areas rival those employed in transistor and gyro assembly rooms.

A second key advance in magnetic tape for industrial use is the development of special oxides with improved short wave length recording properties. Frequency, tape speed, and recorded wave

length are related by the formula shown in the illustration. This shows the recorded wave length to be directly proportionate to tape speed and inversely proportionate to frequency. The trend in recent years is toward recording higher frequencies at lower speeds. This results in more information in less space and requires the recording of shorter and shorter wave lengths.

The higher remanent induction of "B" type oxide permits a reduction in the coating thickness of magnetic tape without changing the flux value. This reduced coating thickness possible with "B" oxide gives better short wave length output due to the distribution of magnetic field strength around a recording head.

The Technical Features

If the recording gap is idealized to an infinitesimal slit, the recording field can be represented by half circles. In region I, at considerable distance from the recording slit, the field intensity is so low that the magnetic material of the tape is unaffected. In region III, very close to the head gap, fields are so high that the tape coating is completely saturated on each excursion of the signal and hence small changes in signal amplitude have no effect on the ultimate magnetization of the tape.

In region II, however, the tape is subjected to fields which are neither inconsequential nor saturating. The ultimate signal left on the tape is determined by this region. The smaller it can become without a sacrifice in output, the better the short wave length output of the tape. "B" oxide requires a smaller region II field than "A" oxide and hence has a superior short wave length output.

The terms "A" and "B" oxide are taken from the military specification on instrumentation tape (*MIL-T-*21029 — *Ships*) — a qualified source of detailed information on magnetic tape. This document is available upon request from the Bureau of Ships in Washington, D.C. and contains a number of specific tests that all *"instrumentation quality"* magnetic tapes must pass.

A third and very recent key advance in magnetic tape for industrial use is the development of sandwich tape. In sandwich construction, the oxide layer is covered by a thin *(50 micro-inch)* coating of protective plastic.

Sandwich tapes were developed specifically for applications where physical wear is a problem. This is typical of most computer or digital recording work. In this field, it is not uncommon for many thousands of passes to be made through a recorder in a matter of minutes. In addition to the high replay factor, sandwich tape makes possible higher operating speeds, longer runs, and meets faster stop-start requirements.

Material in badly worn condition will exhibit output variations, by the coating defects. Following errors then will make it necessary to take the tape out of service.

Sandwich tapes represent an advance which virtually eliminates tape wear and the problems arising from this condition. In place of exposed iron particles, sandwich tape presents to the recording head a smooth non-abrasive surface. This results in a 10-fold increase in tape life, elimination of most *"rub-off"* wear problems, and increased equipment life. All are significant in improving the performance of a magnetic recording system.

The presence of a non-magnetic sandwich layer naturally decreases the short wave length response of the tape. This is partially compensated for by the use of type "B" oxide in all sandwich tapes. The net result is a tape construction with improved wear properties. There is no loss in pulse resolution up to 500 pulses per inch.

Multi-Purpose Ends Are Served

Industrial uses of magnetic tape require properties substantially different from those of normal sound recording applications. Higher quality requirements call for substantially improved manufacturing facilities and techniques. The drive toward more data in less space has led to the development of specialized oxides. Increased physical requirements have resulted in sandwich tapes. ■

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At Press Time . . .

IBM Announces Transistorized Business Automation System—Type 1401

NEW PRODUCTS to increase data processing power in offices, banks and factories were demonstrated for nearly 50,000 business executives by International Business Machines Corporation.

The businessmen gathered in hotels and offices in ninety-two cities throughout the United States to see a closed-circuit telecast featuring the new equipment. In addition the show was seen by the IBM World Trade Corporation field organization in Montreal, Toronto and Vancouver. The new all-transistorized equipment provides high-powered data processing within a price range previously limited to conventional punched card accounting machines.

The 1401 can read 800 IBM cards a minute (unit at left in photo), do 193,300 additions a minute. Magnetic tape units (right) are able to read up to 62,500 characters of information into the system in a second. The girl stands at the 600-line-a-minute printer which has the unique faculty of being able to skip over blank lines on printed forms at the rate of seventy-five inches a second.

The features of the all-transistorized Data Processing System include: high speed card punching and reading, magnetic tape input and output, high speed printing, stored program, and arithmetic and logical ability. The elements of the basic 1401 system are the 1401 Processing Unit, 1402 Card Read-Punch, and 1403 Printer.

The 1401 performs functions previously requiring a number of separate machines: card reading and punching, separation of output cards, calculating, card to magnetic tape conversions and printing.

The 1401 may be operated as an independent system, or, as an auxiliary to large scale data processing systems.

Simplified programming techniques make the 1401 powerful and efficient. Variable length data and program instruction words provide maximum utilization of the magnetic core storage. Program steps may be skipped or reread in any desired sequence, a feature which increases programming flexibility. With the 1401, manual control panel wiring is eliminated. The 1401 incorporates the building block principle, providing for expansion and a variety of combinations to fit the needs of individual users.

COMPONENTS OF THE SYSTEM

1401 Processing Unit

This unit controls the entire system by means of its stored program. It performs the arithmetic and logical functions, controls card reading and punching, magnetic tape input and output, and tells the printer what to print and where to print it. The 1401 automatically edits the system's printed output for spacing, punctuation and format. It is available with 1,400; 2,000; or 4,000 positions of core storage. Alphabetical or numerical data may be processed. In one second, the 1401 Processing Unit can perform thousands of additions and multiplications.

1402 Card Read-Punch

The 1402 reads card information into the processing unit, punches cards, and separates them into radial

stackers from which cards can be removed while the machine is running. Maximum speeds are: punching, 250 cards per minute; reading, 800 cpm. Reading and punching can be performed simultaneously.

1403 Printer

The printer incorporates a swiftly moving horizontal chain (similar in appearance to a bicycle chain) of engraved type faces, operated by 132 electronically-timed hammers spaced along the printing line. The impact of a hammer presses the paper and ink ribbon against a type character, causing it to print. The chain principle greatly reduces the number of sets of type characters needed. The 1403 prints by means of a scanning operation which compares characters on the chain with characters in storage designated to be printed. When a character on the chain matches the one in storage, the hammer for that printing position is fired. The chain of engraved type faces moves across the face of forms or documents at a constant speed of ninety inches a second. Two interchangeable type styles are available for the chain. The dual speed carriage has the ability to skip over blank spaces on forms and documents at speeds in excess of normal printing rate. This carriage skips the first eight lines at thirty-three inches per second, and beyond eight lines at seventy-five inches per second. Combined with a printing speed of 600 lines per minute, the result is a higher rate of output than is obtainable with many printers of greater line printing speed.

All electronic and logical operations of the Printer are under the stored program control of the 1401 Processing Unit. Information to be printed is read into storage from the input cards or magnetic tape, processed, and read out to the Printer.

Magnetic Tape Units

Up to six IBM 729 Magnetic Tape Units (Model II or IV) may be added to the 1401 system for increased input, speed, and storage compactness. These are the same all-transistorized tape units used with the IBM Series 700 and 7000 data processing systems. Either single or double density tapes are specified to provide processing speeds of 15,000 or 41,667 characters a second with the 729 II; 22,500 or 62,500 characters a second for the 729 IV.

1210 Sorter-Reader

The 1401 can also be linked to an IBM 1210 Model 4 Sorter-Reader for direct processing of paper documents imprinted with magnetic ink, providing banks with a system for mechanizing bank demand deposit accounting and account reconciliation, transit operations, installment and mortgage loan accounting and other banking functions.

1401 Data Processing System Prices

"Typical" 1401 Card System		Minimum or Basic 1401 Card System	
Purchase	$149,300	Purchase	$125,600
Monthly Rental	$ 3,180	Monthly Rental	$ 2,475
"Typical" 1401 Tape System		**Minimum or Basic 1401 Tape System**	
Purchase	$223,950	Purchase	$162,750
Monthly Rental	$ 5,850	Monthly Rental	$ 3,900
"Typical" 1401 Card/Tape System		**Minimum or Basic 1401 Card/Tape System**	
Purchase	$271,400	Purchase	$216,000
Monthly Rental	$ 6,750	Monthly Rental	$ 5,175

IBM 1210/1401 Combination Data Processing System Prices

"Typical" IBM 1210/1401 Card System (1 Sorter-Reader)	
Purchase	$236,150
Monthly Rental	$ 5,280
"Typical" IBM 1210/1401 Tape System (1 Sorter-Reader)	
Purchase	$358,250
Monthly Rental	$ 8,850
Increased Processing Speed (IPS) for IBM RAMAC 305	
Purchase	$ 6,200
Monthly Rental	$ 150

(These costs are in addition to the standard RAMAC 305 selling or rental price.) ■

Golf Handicapping on a Computer

These Handicaps Don't Lie

GOLF, a sport long known for its unusual approaches and numerous gadgets, has actively entered the age of the computer.

While it is doubtful that a computer will ever solve the problem of making a three-iron shot over a yawning trap and onto the green, golf handicaps are now being computed by a machine accounting system used by Integrated Data Corporation of Costa Mesa, Calif.

This system assists the handicapper found at almost every golf club and eliminates the expenditure of the hours every month he'd use figuring the members' latest handicaps.

The handicap is a mathematical system, based on averages of current scores, which seeks to equalize the skill of individual players. Thus a player who averages in the low 70's will have a lower handicap than another player whose average is in the 80's. By comparing handicaps, these two players will arrive at the number of strokes to be granted the player with the higher handicap — giving this individual a mathematical chance of defeating the better golfer.

Two Methods

Basically, there are two methods of achieving the golf handicap — the *basic* and the *current ability* systems. The basic system, commonly used in California in computing women golfers' handicaps, averages the best ten scores out of the last 25. The current ability, for use in computing male golfers' handicaps, utilizes the best ten scores out of the last 15 and compares this average to a course difficulty rating. This comparison results in a figure called a differential, which is used to determine the handicap.

The handicapper, faced with computing the monthly handicaps of, say, 500 club members, is in for many tedious hours of work. This often causes club handicaps to be published too late in the month. After much study in cooperation with systems specialists, a method was devised which uses punched card accounting equipment and an electronic computer. This new procedure speeds golf handicapping tremendously and prevents errors in the computation of handicaps.

By William A. Gothard

The only investment in this process is the small sum we spend to rent data processing machines. We punch the information we get about the golfers into cards; the bulk of the work is done at a service center in Los Angeles.

At the center no equipment is rented, only the amount of time is figured that it takes to transfer the information from cards to the computer and obtain the answers. It is something very much like a woman who wants to run up a pair of drapes and goes to her local sewing machine center to use their facilities for this one brief job. There's no more need for her to invest in a machine than there is for us to purchase, or even rent a computer.

How It Is Done

When computing a club membership's handicaps, we obtain from the club handicap chairman a record of each member's most current scores — 25 for women and 15 for men. In the form of a differential figure, they're entered on custom-designed forms and returned to our office. In later handicapping operations the differentials are entered on convenient wall score sheets provided by us. These differential figures are introduced directly from the set-up form to punched cards. We place the member's name, club number and player number in a master card in punched codes. In addition, our punching machine produces a separate card containing player identification and the differential figure for each game played.

These cards are mechanically sorted, grouped by player, and transported to the service center. The computer then automatically selects the top ten scores, averages these figures, compares them with a handicap table and computes the handicap — the entire operation encompassing only ¼ second per individual, or four handicaps per second. Club name, player name, handicap and the number of games played at home and away are mechanically produced in quadruplicate printed form.

Two copies of this information go to the country club for posting, and another is sent to the Southern California Golf Association. The final copy is retained for our permanent file.

The speed of this system allows us to close our record month as late as the 23rd day, process over 8,000 separate members' scores and return computed handicaps to the home club in time for a first-day-of-the-month posting.

This speed, plus the inherent accuracy of data processing methods, have allowed us to revolutionize the golf handicap field. Our pioneering efforts in this field were readily endorsed and approved by both Men's and Women's Southern California Golf Associations.

The system has only one disadvantage — a golfer dissatisfied with his or her assigned handicap can't argue with the system and win! ■

W. E. Thompson, Office Manager, Group Hospitalization, Inc., Washington, D. C., says

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". . . That's why we're grateful to Murray & Heister, Baltimore Business Forms dealer, for showing us the 2 to 6-part pasted continuous forms. Since we began using them, we've been more than satisfied . . . they've never given us any trouble, mechanically or otherwise . . . and Baltimore's forms cost us less!"

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J. ROSS ROTHAERMEL, Auditor, The Cleveland Trust Co.

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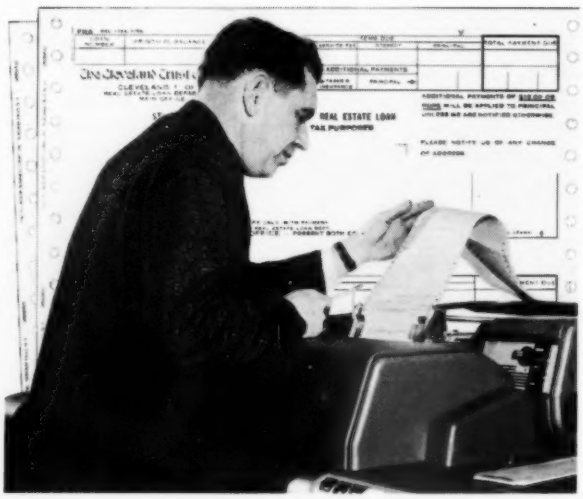
An automated collection system has given The Cleveland Trust Company centralized control over 40,000 monthly real estate loan payments made in 69 different offices. Machine control of accounting functions makes the exact cash position of the department known *daily:* in the past, payments were held in escrow and balanced only four times a year. Human error has been cut to a minimum. Hand copying is eliminated. Work time has been shortened by days, and operating costs cut.

Automatic printing of data from punched cards on specially designed forms is basic to the system. Electric accounting machines compute interest at varying rates, collate names and addresses with the payment due and print complete and accurate statements, ready for mailing. They also isolate cards representing delinquent accounts for special handling. As payments are received, the same machines are used to compare total receipts with total expected returns, and to punch new balance cards, ready for the next monthly cycle.

"The Moore man was instrumental in designing this system," reports Mr. J. Ross Rothaermel, Auditor of the bank, "not to mention the form that lets it work." The form is a 2-part Moore Speediflo—the bank's control in print.

The Moore man has designed over 200 forms for Cleveland Trust. If you'd like a more detailed description of the systems that use these forms, write the Moore office nearest you. No obligation.



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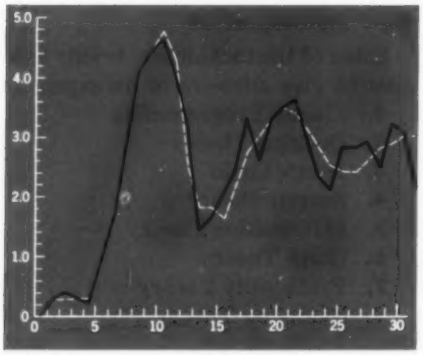


COVER FEATURE

Operations Research

A Basic Discussion of the Field

THE BEGINNINGS OF OPERATIONS RESEARCH are to be found in Great Britain's "darkest hour." At that time scientific personnel were assigned to various operational groups of the British Imperial Staff to do research into military operations. One of their most striking accomplishments in those hectic days was the development of the tactic of sending many ships in few convoys as opposed to fewer ships in many convoys. It does not involve much thought to realize that some of the factors involved were enemy capabilities as represented by enemy weapons ability and attack patterns, route and tactics of the convoy, the size, type and ability of armed escort, etc. These represent only some of the more salient factors. Others were weather, air coverage, speed, tides and passive resistance methods. These OR groups and their work were, of course, utilized by the U.S. Armed Forces for whom they solved many problems of significant tactical and strategic importance.

OR, born of necessity in a most trying set of circumstances, grew and thrived under adversity of the severest type. In 1945 the world struggle culminated in victory for the Allies and OR, in the minds of many, was discharged. In the interim, at Harvard University, the University of Pennsylvania, and other locations, feverish research was bearing fruit — the development of a high speed computer — which made a tremendous impact on business practices. As applied in its inception during World War II the computer was somewhat elementary and to a large degree, highly theoretical. The highly developed computer now enabled OR to mature, to expand, become business oriented and gain wide acceptance as another profitable tool of management.

Diversity of Views

There are many conflicting views about OR and its profitability. Much of this conflict arises from a lack of knowledge and the consequence of this situation — fear. Some managers fear that scientists and engineers will force them out of their position, that they will have to take an engineering or science course in order to keep abreast or, that eventually, not men but a series of machines will be running their businesses.

In order to clarify what OR specialists try to do, let us first consider the term, especially the RESEARCH half of it. By no stretch of the imagination can the management function — decision making — be implied. On the other hand, all of us do *research* in every day operations — looking up a telephone number is a good example. In the operations of business the inter-play of a host of factors, almost approaching infinity, cannot possibly be assimilated in total, weighed and the best solution arrived at in time for it to be most effective. The passage of time and a burgeoning population and economy, to say nothing of governmental regulations, have forced extremely complex conditions under which present day business must operate.

(continued on next page)

By M. J. Sullivan

The erosion of inflation and the fierceness of business competition have almost necessitated the adoption and use of OR. Necessity, being the mother of invention as the adage proclaims, very nearly demanded the two prong development and maturity of computers and OR. Still, this combination as of now has only enabled business to stay abreast of the complexity. More importantly, some people feel that there does not appear to be in the offing a significant break-through of such proportions as to be revolutionary. It is somewhat disappointing that man keeps complicating his affairs to the extent that such equipment as electronic computers and punched card/tape machines, with their awesome reputation for speed, can be relied on only to keep him side-by-side with complex conditions.

At this time, with the recession a recent memory, let us see if we can discover just where OR is, and where it seems to be headed.

Many a manager has no qualm about a computer doing his payroll or accounts receivable, yet these same managers shudder at the suggestion of using OR. Managers are supposed to be mature and intelligent persons who are doing an excellent job in their various capacities but at a somewhat frightful price — heart attacks, ulcers and so on. No iteration of statistics or their interpretation is needed here. The fear of failure in current day business is almost as strong as the self preservation instinct. Yet managers often are allowing themselves to operate under almost intolerable conditions due to the complexity and competitiveness of business.

It is not being claimed here that OR will solve all problems for all time. There is, however, a new development of operations research that could well provide the break-through. It is in the area of management games and the simulation of operations. A companion article in this issue explains this development quite thoroughly.

This tool of modern management can evolve into the ultimate method of forging ahead of current and forecasted business complexity. By diligent and thorough reading and discussion with qualified people in the field, the basic principles and objectives fall into place. The businessman of today can and should allocate some time to discovering and understanding the *"space age"* of business management. He can begin by reading the articles specifically devoted to this field. This advice also is applicable to anyone who is connected with the punched card and data processing industry — punched card supervisors, operators, programmers, and others.

In the not too far distant future, the term operations research will be as universally known as computer is today. For this reason exposure of practitioners, practical managers, etc., to the field of OR cannot come too soon. It will at least remove much of the mystery currently surrounding it.

Eight Methods of OR

Some of the techniques, briefly explained, that OR uses to give answers to management are:

1. Linear Programming
2. Queuing Theory
3. Monte Carlo
4. Search Theory
5. Information Theory
6. Game Theory
7. Probability Theory
8. Sampling Theory

1. Linear Programming is a mathematical procedure which evaluates various combinations of a number of alternative factors. These factors all have a linear interdependence with one another. The goal is to arrive at the best or optimum combination of these factors.

2. Queuing (or Waiting Line) Theory, as the name indicates, is concerned with solving problems wherein relationships of waiting lines are involved.

3. Monte Carlo method involves the simulation of a group of random variables from a number of variables which are too numerous and complex for all to be used.

4. Search Theory has had limited usage so far but is essentially a technique of rendering optimal results with minimal tools in searching or locating.

5. Information Theory is composed of analytical methods to assess the usefulness of a communications system.

6. Game Theory creates a mathematical model which is the result of two or more competitors striving to attain a certain goal. It is a technique of strategy wherein the decisions affect the mathematical model.

7. Probability Theory is one of the most useful operations research techniques. It applies to such situations where the chance or probability of breakdown of a machine is known beforehand or can be assumed.

8. Sampling Theory is an estimating technique which makes it possible to design random samples which will provide the data needed to calculate the parameters or characteristics of a universe or population within a desired level or percentage of accuracy.

The above are but thumb-nail sketches of OR techniques but they should provide a basic introduction or review.

A Definition

It is hoped that some of the elements of mystery surrounding OR have been cleared up. Perhaps the most elemental definition of OR is that it is the application of the scientific method to problems of business operations. In closing it should be noted that many companies employ this useful tool but there are many, many more who should. ■

Management Games Using Punched Cards and Computers

Realism without Ruin

DURING THE PAST TWO YEARS since the American Management Association announced the development of the first practical top management computer game or simulation exercise,* many companies and universities have developed similar exercises and have incorporated them into their management training programs. Recent conferences on business games and management simulation have stressed the important educational value of gaming. Also all indications are that the use of simulation exercises and games in executive training programs will increase substantially in the next few years.

*Top Management Decision Simulation: The AMA Approach, American Management Association, 1957.

By Clifford J. Craft

AMA Simulation Exercise

The AMA top management simulation exercise is based on a mathematical model of the business world. This model consists of a group of cause-and-effect formulas or mathematical equations that determine the interaction of the decisions made by each competitor in the exercise. The results are calculated by an electronic computer which contains in its *"memory"* the formulas of the model and thus is equipped to act as scorekeeper.

Participants in the exercise are divided into up to five teams or *"companies."* All companies are assumed to be manufacturing, in direct competition with each other, one identical product in the five-to-ten-dollar price range. At the beginning of the exercise, each company has exactly the same share of the market, exactly the same dollar value of assets, and exactly the same range of choices available.

The teams are given a fixed amount of time, initially about forty-five minutes, to organize their companies, plan their strategies, and select their decisions for the first period of the exercise, which represents three months or a quarter of a year in terms of the real business world. They elect officers, draw up organization charts, and prepare job descriptions for the functions involved — unless they decide to choose some other form of management, such as a committee. They set their companies' business policies and objectives, spelling them out in writing, and set up annual and long-range budgets for their firms. Then, from a list of specified alternative amounts, each company decides what price it will charge for the product during the quarter and how much it will spend for production, marketing effort, research and development, and additional plant investment.

Cycle of Steps in AMA Exercise

The companies indicate their operating decisions by circling them on a form, distributed to them at the start, which shows how much money each team has and what it can spend it on. When the choices have been made, the forms are collected and the decisions are key punched on cards for processing by the computer. Using the formulas in its memory, an IBM 650 computer calculates for each company the effects of its own and its competitors' decisions on the company's financial and operating position. Five minutes later each team receives a new balance sheet and income statement, printed by an IBM 407 printer, showing how much of the product the company sold during the quarter and what its costs and profits were.

The companies are given about fifteen minutes to review their results, see how well they did during the quarter, try to guess what happened to their competitors and what the latter are going to do next, and revise their own tactics accordingly. Then, they circle their new decisions for the next quarter. This cycle is repeated quarter by quarter until the equivalent of several business years has elapsed. In a few days' time after the exercise, the participants meet in a *"critique"* session to get a look at their competitors' results, compare notes on strategies, and analyze where they went wrong and why.

Role of the Computer

The complexities of the decision-making process in the AMA simulation exercise arise naturally out of the multi-sides, multi-stage nature of the simulation. The model itself is mathematically a simple one. It does not really require an electronic computer as scorekeeper. In the early stages of development of the simulation model the results of the participants' decisions were calculated by the research group on desk calculators. Computations for a single period took about forty-five minutes. Performing these computations on a computer enabled the AMA research group to make the simulation exercise more realistic for both participants and staff and yet cut down on the total computation time. The total processing cycle — key punching, computing, and printing — takes less than five minutes on the 650. Using a computer, a wide variety of mathematical and clerical services can be performed for the participants, freeing them to concentrate on actual decision-making. Also, the results of decisions are available almost instantly, a factor of considerable psychological value in any training situation.

Only the basic IBM 650 computer system is utilized in the AMA simulation exercise. The only memory unit employed is the magnetic drum. Information is read into and out of the computer on punched cards. The output cards are translated into report form by an IBM 407 printer. Before the exercise begins, approximately 1500 machine instructions, which the computer executes during the exercise, are loaded onto the magnetic drum from punched cards.

The computer used is a self-checking machine. When an error is made, the machine stops and an indicator lights on the control console. Since the machine never can make an undetected error, no checks need to be built into its instructions. It is programmed, however, with several checks to guard against input errors. When the teams' decisions are inserted into the computer, it adds up each company's expenditures and compares the total with the funds that company has on hand. If a team spent more than its available working cash, computations are halted, and the company is notified that it must make a new set of allocations. A similar check could be used to prevent a company from deciding to produce more units of product than is possible with its existing plant capacity. Instead, the computer is instructed simply to list as decision alternatives on the quarterly report form only those manufacturing levels that are feasible.

The availability of an electronic computer was of great value in the development of the simulation model. The effect of slight changes in the mathematical model could be determined more rapidly and more easily than by hand calculations. Further, its use in the simulation exercise provides the advantages of clear, concise, error-free reports of results, simplicity of play for participants, and speed in evaluating decisions. The computer also permitted a more realistic model, more combinations of reports, and more data collection for analysis.

Materials Management Exercise

Most management games developed to date are competitive games like the AMA top management game. Groups of players or teams simulate competing companies, and generally the objective of each team in an exercise is to *"win"* by, for example, amassing the largest total assets. Recently a new type of non-competitive game was jointly developed by the AMA and Remington Rand. It is known as integrated materials management simulation.

The research program leading to the development of this new type of simulation exercise was launched shortly after AMA announced their first course using the top management decision game. The idea for the game and the direction for this program grew out of early meetings between Mr. Al N. Sears of Remington Rand and Mr. Franc M. Ricciardi and the author from AMA. The purpose of the exercise was to provide executives with simulated experience as a materials manager — a new industrial management concept. The game was de-

signed to be used in the new AMA one-week orientation seminar on Integrated Materials Management. After the project was launched, the actual mathematical and programming work on this project was done by Mr. Joel M. Kibbee of AMA and by Mr. David McGalliard and Mr. Ed L. Fitzgerald of Remington Rand. The early versions of the exercise were programmed on Remington Rand's Univac I large-scale computer.

The following is a description of a recent version of the materials management simulation exercise. It is based upon a more detailed description of the game which may be obtained by writing to Mr. Andrews M. Lang in care of American Management Association, Saranac Lake, New York.

In the materials management exercise, a team or group of executive trainees is given the opportunity to manage the overall flow of materials from the purchasing of raw materials through inventory control and production scheduling up to the distribution of finished goods to field warehouses. The objective of the team *(headed by a "materials manager")* in this exercise is to manage the company's operations in such a way as to achieve the lowest total annual cost for the overall operation. This, obviously, includes the overall optimization of the conflicting classical objectives of inventory management *(i.e. minimum levels of inventory)*, production management *(i.e. leveled production)*, and marketing management *(i.e. high inventory levels)*.

The integrated materials management exercise simulates the flow of materials in a manufacturing organization. The company has two plants, manufactures two products and markets them in two regions. Several companies may be in operation at the same time, through joint use of the computer, but there is no interaction between them and each operates independently of the others. There is competition only insofar as each company, starting from the same conditions, attempts to achieve the best performance.

The objective of each company is to satisfy the sales demand at minimum cost through good materials management. The demand varies from month to month but is not known in advance by the participants — although a sales forecast is usually provided — nor does their action influence the demand. The sales price is fixed; a sales income and gross margin are shown to the participants at the end of each simulated period. The general objective is to maximize gross margin. Except insofar as stockouts represent lost revenue, gross margin is only increased by decreasing costs.

The simulated time period is in months. The "new management" takes over at the beginning of January *(Month 1)*, has at hand the performance report for December *(Month 0)*, and proceeds to make decisions. These are fed to the computer and a performance report for January returned. Decisions are now made for February.

The exercise normally runs for twelve simulated months; the participants, however, are to attempt to leave their companies in a sound position. It should be emphasized that while maximum accumulated gross margin is the general objective, it is neither necessary or sufficient proof in itself of good materials management.

Advantages of Management Games

Some of the reasons for the significant development in the field of management games during the past few years are:

1. The high degree of realism which is possible in a management game, particularly in computer-type games as opposed to the slower non-computer or manual games* and static case studies.

2. The amount of personal involvement and the intense personal motivation which generally are possible to achieve even with relatively simple mathematical models.

3. The substantial compression of time which, in the AMA top management decision game, approaches one year of simulated operation per hour of actual play.

4. The possibility of using a player's experience as a basis for personal evaluation.

Other general features of management games are:

1. Manual, or non-computer games can be used very effectively in training and are quite inexpensive.

2. Games can be designed to teach almost any level of management or any area of specialization.

3. Games, particularly simple ones *(e.g. non-computer games)*, are an effective way to *"break the ice"* in opening a meeting.

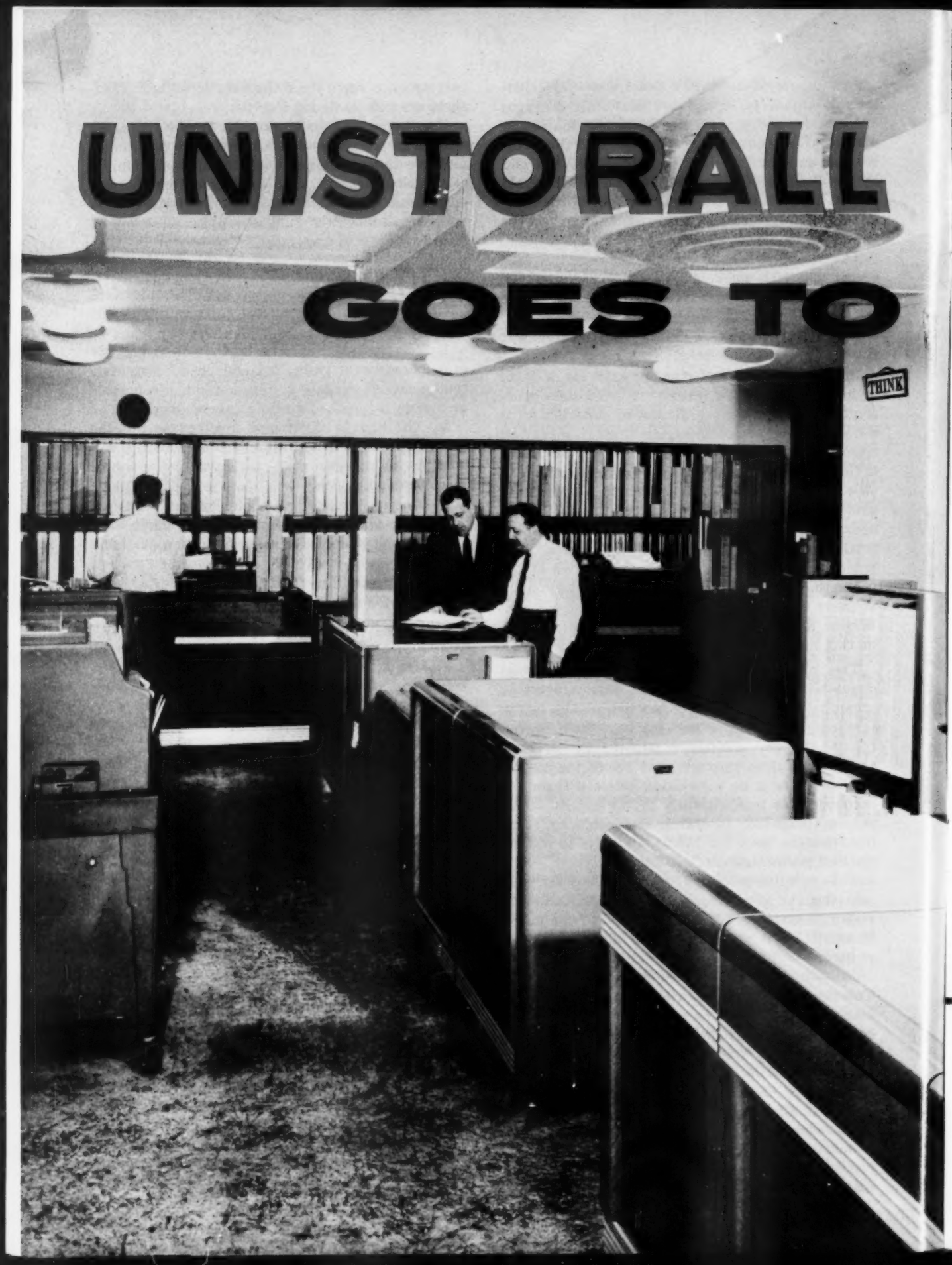
4. While many games are very simple and do not include random factors in their models, these games are still nondeterministic from the players' points-of-view since the players generally are not given a perfect forecast of future market conditions.

Pitfalls to be Avoided

Notwithstanding the many positive benefits of using simulation in training, games must be used with real caution. As anyone who has played a management game knows, a game can be a very traumatic experience to an executive who is *"losing,"* simply because the personal involvement is so great. Also, many of the classical safeguards of traditional teaching are lost *(e.g. a student usually*

(continued on page 30)

*For a description of a manual or non-computer game, see the article "In Business Education, the Game's the Thing" which appeared in the July 25, 1959 issue of Business Week.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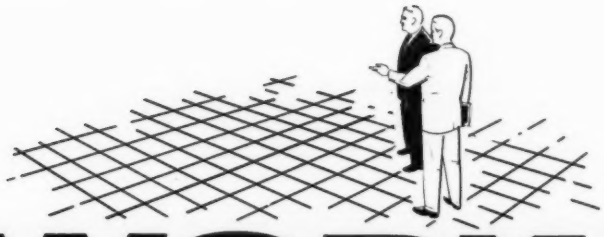

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A Computer Census

Compiled by John Diebold & Associates, Inc.

Large-Scale General Purpose Digital Computer Systems

Manufacturer	Computer	Delivered	On Order
Burroughs	Burroughs 220	13	41
Minneapolis-Honeywell	Datamatic 1000	7	—
	Honeywell 800	0	15
IBM	701**	9	—
	702**	11	0
	704	98*	—
	705	115*	—
	709	2*	10*
	7070	0	50*
	7090	0	4*
National Cash Register Co.	304	0	5*
Philco	Transac S-2000	1	20
RCA	Bizmac I**	1	0
	Bizmac II**	4	1
	501	3	30
Remington Rand	1101, 1102**	10*	0
	1103, 1103A	25*	0
	1105	5*	—
	Univac I	60*	—
	Univac II	19*	—
Total Large Scale Computers		383†	

* Unofficial estimate. ** No longer in production. † 21% incr. over 1/12/59.

Medium Scale General Purpose Digital Computer Systems

Manufacturer	Computer	Delivered	On Order
Alwac	Alwac III-E w/tapes	4	3*
Bendix	G-15 w/tapes	68	—
Burroughs	205 w/tapes	84	22
IBM	650 w/tapes and/or Ramac	190*	—
Remington Rand	Univac File-Computer O	26*	—
	Univac File-Computer I	59*	—
	Univac Solid-State 80	0	55*
	Univac Solid-State 90	0	45*
Underwood	Elecom Series**	13	0
Total Medium Scale Computers		444†	

* Unofficial estimate. ** No longer in production. † 28% incr. over 1/12/59.

Small Scale General Purpose Digital Computer Systems

Manufacturer	Computer	Delivered	On Order
Alwac	Alwac II & III**	8	0
	Alwac III-E	30	8*
Bendix	G-15	157	—
Burroughs	205 (no tapes)	21	9
IBM	650 (card)	730*	—
	305 Ramac	400*	—
Monroe Calculating Machine Co.	Monrobot III, V, VI**	11	0
National Cash Register Co.	102**	30	0
J. B. Rea	Readix**	4*	0
Royal McBee	LGP-30	300	35
Total Small Scale Computers		1,691†	

* Unofficial estimate. ** No longer in production. † 24% incr. over 1/12/59.

Miscellaneous Digital Computers

Manufacturer	Computer	Delivered	On Order
Burroughs	E101	203	23
IBM	604	4,000*	—
	607	500*	—
	608	1*	—
	610	40*	—
	CPC**	60*	—
Monroe Calculating Machine Company	Monrobot IX	14	50
Remington Rand	Univac 60 & 120	800*	—
Underwood	100	18	15
Total Miscellaneous Computers		5,636†	

* Unofficial estimate. ** No longer in production. † 9% incr. over 1/12/59.

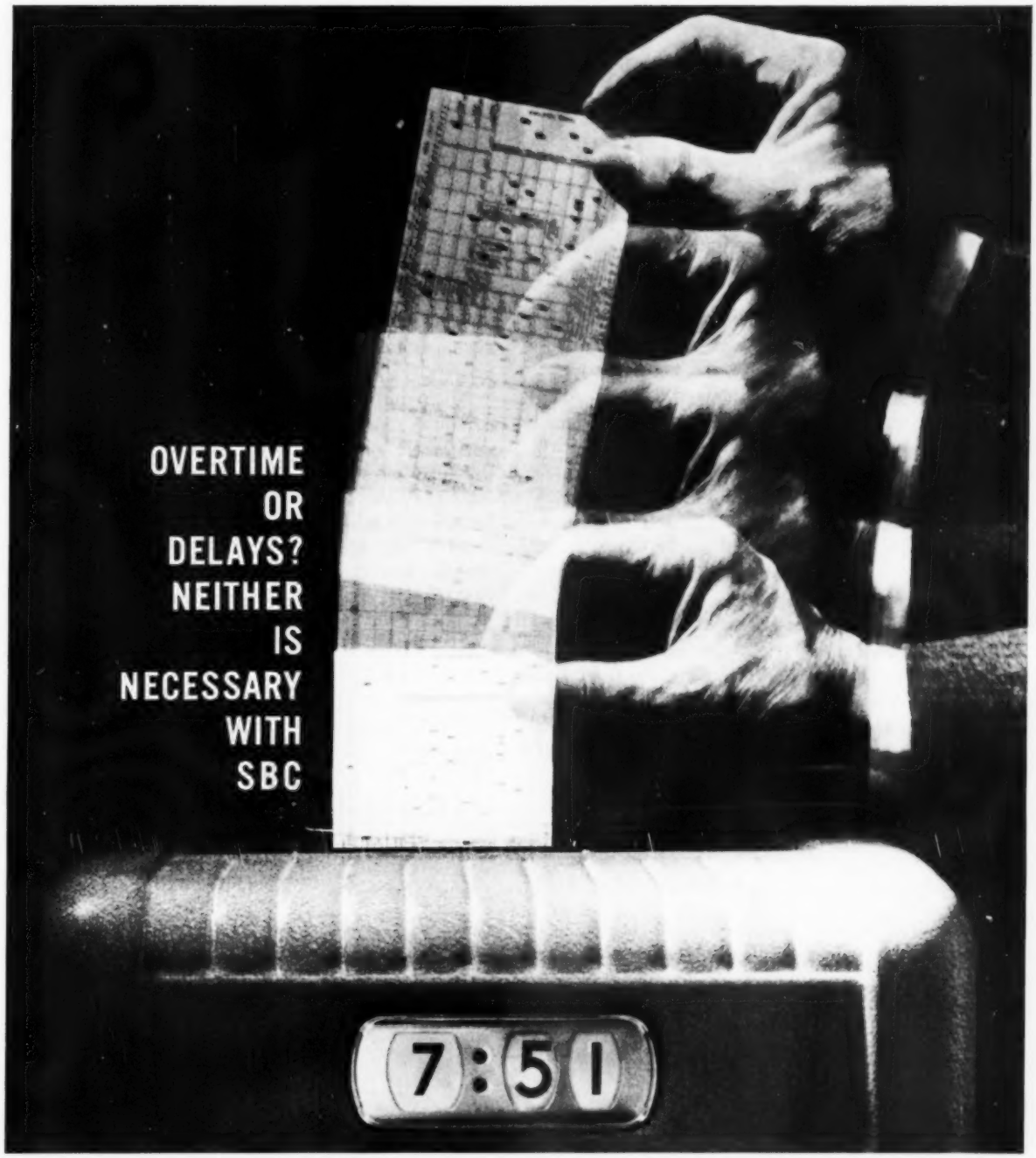
FOR THE FIRST SIX MONTHS OF 1959 the greatest activity — a 28 per cent increase — is in the medium-scale general purpose computer systems. Installations of the large systems have gone up 21 per cent. While "on order" figures are difficult to ascertain and evaluate, there is evidence of large outstanding commitments for the new transistorized models of the large-scale systems, and for the new Univac Solid-State 80's and 90's, for delivery through 1960 and later.

In the medium-scale and smaller sizes, the increases reported for Bendix G-15's and Royal McBee LGP-30's reflect the growing interest in "satellite" computers as well as the growing tendency of smaller users to get into electronic systems, as familiarity with ADP in general grows, and as equipment manufacturers show increased awareness of business applications. LGP-30's went up 41 per cent, and G-15's (both sizes) increased by 33 per cent.

NOTES: As in the last census, the figures here are on a *systems* classification, based on the computer and its associated peripheral equipment as defined below. There is no implied evaluation of machine capabilities in terms of large, medium, and small. Minimum requirements for each class follow:

Large-scale: The system uses magnetic tapes and the computer operates at microsecond arithmetic speeds. *Medium-scale:* The system uses magnetic tapes and the computer operates at millisecond arithmetic speeds. *Small-scale:* The system does not use magnetic tapes and the computer is internally programmed. *Miscellaneous computers* are card calculators and other machines which do not fall into one of the above systems classifications.

John Diebold



How often have you come up to those special or once-in-a-while jobs only to find that all your machines are busy? No machines, no job. And you don't want to go into overtime. **The solution: Call your local SBC office.**

SBC offers the largest, most experienced data processing staff in the country . . . the widest choice of punched card and electronic equipment—including sixteen IBM 650's. You always get an accurate, thorough job . . . delivered on time.

For example: A truck manufacturer has a yearly parts inventory. Over half a million cards are involved. Until it was turned over to SBC, the job required many weeks of overtime and interruption of regular daily work. Quite a chore. Now the job is done in three weeks—**and regular work goes through on schedule.** Next time you're up against a special job with no machinery available, remember your dependable SBC office. They can handle the job. All it takes is a phone call.

CALL SBC® THE SERVICE BUREAU CORPORATION
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80 offices from coast to coast!

Managing a Data Processing Department

How does a data processing manager direct an installation with his feet on the desk? Or to be more specific: How does a data processing manager direct his department effectively and efficiently?

ALL DATA PROCESSING MANAGERS wish to achieve the goal of efficient and effective direction, but few do.

Many blame it on management's attitude. In the author's opinion the most common reason is a lack of initiative and persistent drive to get something done. Three factors to back up this statement are:

1. Complaints to management about how busy we are, asking for more staff and equipment without having facts based on volume workloads and schedules. Facts are required, not complaints.

2. Managers shadow box with a problem instead of finding out what the problem really is, what is causing it and what they are going to do to rectify it.

3. Some are afraid to let go of detailed information and delegate responsibility for fear their staff will know more than they do. If they did delegate responsibility there would be more time to develop the tools that *every* data processing manager should have.

Basically, the managing of a data processing department is separated into five major categories. These are:

1. Staff
2. Procedures
3. Equipment
4. Workload
5. Scheduling

All phases of operational control function about these five major points. Each of these points will be related to an installation of people centered around supervisors, including the manager and assistant manager, plus the equipment involving a number of jobs and a volume of cards used each month.

Staff

Before any man can manage a department or a section within a department properly, he must decide whether he is going to be an administrative supervisor or a glorified machine operator.

No man can coach a team effectively and play at the same time. His team will flounder through lack of planning and direction.

Your people are pros in a big league. To bring the team to the top requires every ounce of energy one can put into directing, planning and instructing.

A team, in any department, is comprised of people, equipment and procedures. One may have the best equipment and procedures on record, but without well placed people they are of little value.

The manager is the expert on data processing personnel requirements for his company. Therefore, in the best interest of the company and the development of a strong team he cannot afford to take "any Joe" or leftovers.

Now, this doesn't mean he must go out and buy the most experienced machine operators. He must get people who are interested in this type of business. He must sell people on the potential of this business over other types of office operations, but before he can sell it he must believe in it himself.

At Ford, we have a tub file operation for the progressive invoicing of all passenger and truck vehicles. It came into effect five years ago with the building of the Oakville Assembly Plant, when we were instructed to have a combination invoice and bill of lading ready as the units rolled off final assembly.

Ninety percent of the people in our machine operations today came to us without any experience whatsoever, and each one was introduced to punched card operations through the tub file application. Granted, every department isn't in a position to have a tub file operation, but the point is that inexperienced people can be the source of staff, provided: These people are sincere in wanting this business, honestly apply themselves to study and

By G. Alan Price

are given the opportunity for training and development.

Three years ago annual training classes for control panel wiring and machine operating techniques were introduced. The staff take these classes at night on their own time. The instructor is paid overtime. The response has been exceptional and one can certainly tell the people who want more out of this business than basic machine operations.

Another point that should be considered and plays an important part in personnel relations is a graduated level of classification for incentive. At Ford Oakville it has been possible to set up four distinct classifications:

1. Clerk machine attendant
2. Machine attendant, having limited ability to wire control panels
2. Machine operator
4. Senior machine operator, who is responsible for co-ordination of machines and staff within a section to meet schedules.

The average person is in his third year before he can be classified as a machine operator, based not only on his length of service, but his ability to handle certain responsibilities and wire control panels of specific complexities. As far as the other half of the team is concerned — key puncher and verifier — they should be good typists to start.

Staff Requirements and Structure

Staff requirements are determined during preparation of a procedure. One very important item here is that too often supervisors do not thoroughly understand the ground rules of a new procedure. One must know volume, schedule and output requirements before he can commit his department to a new or revised procedure. Once these ground rules are defined, in writing, with all parties concerned, everyone must stick to them. Above all, the supervisor should be strong enough to hold firm on original requirements for both sides. A change in original ground rules requires a re-evaluation of workload versus staff requirements. There are too many conditions automatically inherited, such as company policy change, introduction of a new product and increased volume, that disturb the workload and unless he stands his ground on these other requests he will never be able to keep his staff requirements versus workload in balance.

A procedure should never be adopted just for the sake of putting it on punched cards; it is up to the supervisor to show, explain and prove to management why it is or is not economical. Related operations, because of volume and ramifications created by specific conditions, should be assigned to the responsibility of a supervisor.

All key punching and verifying operations should come under the direction of one person. This allows full flexibility for volume operations and avoids the need for soliciting the help of another unit when volume directs.

Lines of authority must be strictly adhered to, so that all instruction and direction flow through proper channels. A supervisor, or a senior man to whom has been assigned certain responsibilities, can not be expected to get best results if the manager or someone in higher authority deals directly with the staff that is assigned to his direction. If lines of authority are maintained, each supervisor or senior man will know that he is responsible for specific jobs and if these jobs are not performed properly he will be held responsible by his immediate supervisor.

Housekeeping

Housekeeping is a very important requirement for operational efficiency. Conduct a regular follow-up and insist that the people do a regular file and desk clean out. Insist on sufficient card and forms storage reasonably close to immediate area of operations. A large installation should have a person responsible for junior duties to handle card and forms inventories, miscellaneous decollating and bursting, requisitioning of forms from stationery, etc. It is too costly and inefficient if machine operators are required to perform these duties while the equipment sits idle.

Communication

A weekly supervisor's operational meeting should be held. One hour is sufficient if an agenda is followed. It should cover such items as workloads, preventive maintenance, overtime report, attendance records, housekeeping and machine utilization.

Insist on fast interdepartmental-communication, that is, mail baskets cleared often so that memos and notes for requested information are processed rapidly.

Attendance

Regular and accurate attendance records should be kept. They are an important tool during staff salary reviews and equally as important in determining an operational availability factor.

Personal Efficiency

The hours of a supervisor are valuable and important since he is usually dealing with several people at one time. Whenever possible he should discourage people from barging into his discussions or meetings. Have these people respect his time as he respects theirs. Ask them to call and arrange for an appointment so you can intelligently plan your hours and meetings. Efficient service can only be provided in an organized sequence. When people do come for their meeting give them full attention.

Procedures

Every procedure should be built on a foundation of effective controls. Every effort should be made by the supervisor to make sure that these controls

are introduced into the buildup of a procedure. Do not accept any procedure as drawn up, but challenge its logic and economy. It should be realistic and factual. An essential element of good supervision is the close follow-up of procedural operations to see that they are progressing satisfactorily and on schedule. Operational procedures should be analyzed critically from time to time for the purpose of producing effective results.

Every step of a procedure *(with samples)* should be recorded prior to startup date with continuous updating as required. The maintenance recommended is one copy of a procedure write-up per job under the control of the operational supervisor.

It is also recommended and suggested that all key punching and verifying jobs be set up in a separate manual by a central source. Each operator should have a complete set. Any changes to these write-ups should be dated and distributed through the central source. This will avoid the possibility of a key puncher or verifier missing a change, due to absenteeism, or misinterpreting a verbal instruction.

Equipment

To each data processing supervisor preventive maintenance is as important as the scheduling of an operation and should be treated as such. Establish a regular preventive maintenance program negotiated between the equipment representative and the supervisors. Schedule each machine for the required number of preventive maintenance hours per month. A schedule based on working days per month rather than calendar days usually is more applicable to the operating workload. For consistency and ease of scheduling, each machine serial number should come up on the same working day each month it requires maintenance. On the last working day of every month a list should be supplied to each supervisor in working day sequence showing machines in his section scheduled for the coming month, the day and the number of hours required.

Preparing monthly preventive maintenance follow-up will eliminate or reduce the possibility that these hours are scheduled for regular operation.

Even though preventive maintenance is done, there is always the inevitable machine breakdown. A breakdown call book should be available for each section and placed in an accessible position for the equipment service representative and the operators.

Although in most cases immediate service will be verbally requested, all breakdowns should be recorded. Not everyone in the unit should record breakdowns since less experienced personnel tend to jump to conclusions if a machine does not function properly and consequently a machine may be out of operation unnecessarily.

Machine specifications can play an extremely important part in operational flexibility. An attempt should be made, wherever possible, to keep consistent machine specifications.

Two further requirements for efficient supervision are:

a. An available list of the equipment showing specifications and rental of each.

b. A control panel inventory list with a six-month concentrated review of wired panels.

Proper space between each piece of equipment will increase operating efficiency; they should be positioned for proper volume output. A machine operator should not be allowed to label a piece of equipment as being his. This is what is referred to as a machine hog. All machines within a section should be under the direction of a central control and assigned to each machine operator as work volume and schedules direct.

Workloads

To analyze and administer proper workload control requires that every job be identified by number. Establishing a number for each job then becomes the initial stage for service assessments. Every department for which the department performs a service should pay for that service. This is known as job costing. A job costing procedure is a means of arriving at daily machine utilization job control and workload analysis. If the company does not recognize the need for assessments it becomes necessary to perform the basic functions of a job costing procedure. To do this, staff time cards, machine time distribution sheets and job costing ledger sheets are needed. Each member of the staff records on time cards, the appropriate hours applied against each job. In this way we know jobs are not strung out to keep someone busy and we get efficient machine utilization. Key-punch operators record on their time cards the number of cards key punched. This information is used to assess new card usage. The job costing clerk groups time cards by type within job number and records these hours on job costing ledger sheets. A separate machine time sheet is assigned to each machine every day. The machine operators mark off starting and ending time for applied time against a given job. Length of machine breakdown is also recorded on this time sheet. The machine operators record on applicable machine sheets the totals of any new card usage. The job costing clerk calculates and records the applied staff and machine time by type. Idle time is also recorded. All jobs do not lend themselves to punched card procedure when economy is taken into consideration.

Operational Availability Factor

In an estimate of staff requirements per job one should calculate staff availability on the basis of 100%, but should take into consideration an item referred to as operational availability factor. This

means the number of actual working hours available per person per month.

A company working five days a week, for twelve months a year, averages approximately twenty-one days per month. This represents 168 hours per person. The staff hired is not available for the full 168 hours per month.

We have determined our operational availability factor by taking:

a. total annual salary hours payable — per payroll,
b. less authorized vacation,
c. less authorized statutory holidays,
d. less satisfactory absenteeism factor — per industrial relations,
e. less break period;

divided by 12 months = total available hours.

This central workload control indicates whether the overall departmental requirements for the new procedure can be handled or whether equipment and staff must be supplemented with "X" number of hours per month.

All requests, permanent or one-time, should come to the manager or his supervisors in memo form signed by supervisory level of requesting personnel. This method of operation initiates two controls. It eliminates misinterpretation of requirements on a verbal request and provides necessary support to estimate the requirements to management.

As people grow taller in the field of operations they become more efficient in organizing their work. Therefore, to keep staff requirements versus workload volume in balance, the workload control book requires continuous updating and adjusting.

Scheduling

The effectiveness of a data processing department is determined by the co-ordination of machines, staff and procedures. This is scheduling. The objective of scheduling as it applies to data processing is to produce, on time, the desired reports with a minimum number of machines and operators. Too many machines and too many operators for the amount of work may make scheduling unnecessary, but in that case the department may be economically unsound. Scheduling allows you to accomplish the following:

1. Utilize equipment effectively
2. Provide better service
3. Reduce machine conflicts
4. Anticipate workload requirements in advance.

Effective scheduling must be kept in a simple form, otherwise the scheduling operation will become too complicated and costly and eventually be stopped. Each supervisor should have a continuous projected workload list on his desk at all times. Each supervisor should make any necessary daily adjustments to this list and assign staff and equipment requirements to meet due out times. Prior to the beginning of each month a list should be prepared to show each supervisor what is scheduled within that coming month such as quarter or annual operations.

If there is an annual operation that is to be completed by May 15th and can be started as early as April 20th, this operation should appear on the April listing produced at the end of March. This will give the supervisor the opportunity for advance information he otherwise would not have. Establish schedules prior to the introduction of a new procedure. Once these schedules are established, supervision should not arbitrarily go off schedule without negotiated approval with the receiving department. Therefore, if over normal workload, excessive absenteeism, or excessive machine breakdown occur, the manager is left with two alternatives:

1. Negotiate a delay in output,

OR

2. Recommend necessary overtime to keep on schedule.

Data processing management should not short cut a procedure control to balance staff versus workload requirements or to accelerate a schedule. If it does, it leaves itself wide open for error factor and criticism.

Announcement

IN A NEAR FUTURE ISSUE a report on the ten greatest Contributors and ten greatest Contributions to Data Processing (all aspects) will be presented.

We earnestly solicit your participation. Send opinions on your favorites to The Editor today. Let us get you started with a few possibilities!

CONTRIBUTORS

Dr. Herman Hollerith: concept of punched card systems.

Dr. Howard Aiken: development of large scale automatic computer.

Dr. Claude E. Shannon: development of the transistor.

H. F. van Gorder: development and promotion of punched paper tape techniques.

CONTRIBUTIONS

Alphabetic printing tabluation: (permitted automatic writing of bills, invoices, etc., by punched cards).

Medium-priced random access computer (introduced electronics to the office on a wide scale).

Visual character sensing (promises a big breakthrough in manual key drive recording).

Summary of
DATA PROCESSING APPLICATIONS

Survey of Application Characteristics by Industry and Equipment

WE BELIEVE that sound publishing policy dictates that a business magazine be in close contact with its readers.

It is only in this way that a publication can hope to give its readers what they really need. To help accomplish this a six-page questionnaire was sent to our readers in February and April of this year to determine the existing situation and to solicit expressions of need.

This was the most extensive survey ever made on the broad aspects of data processing.

More than two thousand responded. We were able to gain much useful information for guidance in furnishing you with the kind of material you need.

Included in the questionnaire was a request to specify the applications in use and planned for punched card, punched tape and computer equipment.

A summary of the results is given here in the accompanying five charts. The complete detailed report by each major industry group appears in the new issue of The Punched Card/Data Processing ANNUAL. A total of twenty-eight charts appear in the detailed report.

Those of you who are "students" of data processing *(as aren't we all)* will find special interest in the comparatives represented here. All should be interested in knowing the relative extent of use of each type of equipment for each application function. If you have felt that a particular application was impractical for your use perhaps you may be encouraged to "try again" after seeing the results others are getting.

SUMMARY OF APPLICATIONS OF MAGNETIC TAPE, MAGNETIC DRUM OR RANDOM ACCESS EQUIPMENT	Total using applications	Plan to study	Now being studied	Being programmed	Rejected — Reason				Results					
					Cost too high	Data volume too small	Unable to program	Other	Improved statistical reports	Lower costs	Improved accuracy	Faster customer service	Mostly satisfactory	Mostly unsatisfactory
Billing (Invoicing)	226	25	35	42	3	2	1	4	38	51	70	66	67	1
Sales Analysis	203	17	33	38	3	1		1	81	39	64	26	60	1
Inventory Control	286	28	53	53	3			4	71	59	99	57	88	
Accounts Receivable	146	22	39	23	1	2		2	26	25	36	26	32	1
Payroll	290	28	30	34	2	1		3	78	91	105	35	122	2
Accounts Payable	103	16	22	17		1		2	21	16	27	11	28	
General Ledger	126	22	27	19	1			2	23	26	35	12	29	
Production Control	170	24	33	30	1				42	35	50	35	47	
Cost Accounting	172	26	26	20				1	52	37	57	23	56	
Premium Accounting	65	6	12	11				1	14	14	17	16	18	
Operations Research	123	11	21	12				1	27	20	26	16	41	2
Other:	177	20	33	32	4	2	1	1	66	65	79	56	77	2

SUMMARY OF APPLICATIONS OF PUNCHED CARD EQUIPMENT	Total using applications	Plan to study or Now being studied	Rejected — Reason			Results					
			Cost too high	Data volume too small	Other	Improved statistical reports	Lower costs	Improved accuracy	Faster customer service	Mostly satisfactory	Mostly unsatisfactory
Billing (Invoicing)	1195	264	58	65	8	101	108	145	137	137	5
Sales Analysis	1405	232	38	54	4	230	99	141	48	150	6
Inventory Control	1174	263	36	42	6	123	93	157	68	146	4
Accounts Receivable	1052	211	37	50	9	86	81	110	75	107	6
Payroll	1409	250	30	46	6	147	167	188	51	201	3
Accounts Payable	1018	170	33	45	5	90	84	96	43	111	5
General Ledger	872	165	23	37	8	70	63	84	18	85	5
Production Control	563	136	11	17		74	44	72	42	77	2
Cost Accounting	1034	180	17	23	3	132	93	125	32	122	2
Premium Accounting	303	64	12	17	2	25	27	27	19	34	2
Operations Research	269	49	29	36	57	37	22	29	16	34	1
Other:	607	138	17	17	2	101	82	99	70	98	2

SUMMARY OF APPLICATIONS OF PUNCHED TAPE EQUIPMENT	Total using applications	Results				
		Improved statistical reports	Lower costs	Improved accuracy	Faster customer service	Mostly satisfactory
Billing (Invoicing)	189	21	26	32	35	27
Sales Analysis	81	16	10	12	10	16
Inventory Control	61	9	8	15	14	12
Accounts Receivable	40	7	7	7	8	8
Payroll	52	7	10	8	5	15
Accounts Payable	44	8	4	5	4	7
General Ledger	18		1	1		1
Production Control	36	10	3	8	7	8
Cost Accounting	23	2	1	2	1	3
Premium Accounting	7	1				
Operations Research	12	2	2	1	4	5
Other:	69	16	16	20	20	21

(continued on next page)

COMPARISON OF PUNCHED CARD, PUNCHED TAPE AND COMPUTER EQUIPMENT BY APPLICATIONS NOW IN USE, BASED ON 1863 VALIDATED REPLIES	Punched Card	Punched Tape	Magnetic Tape, Drum or Random Access
Billing (Invoicing)	1195	189	226
Sales Analysis	1405	81	203
Inventory Control	1174	61	286
Accounts Receivable	1052	40	146
Payroll	1409	52	290
Accounts Payable	1018	44	103
General Ledger	872	18	126
Production Control	563	36	170
Cost Accounting	1034	23	172
Premium Accounting	303	7	65
Operations Research	269	12	123
Other:	607	69	177

COMPARISON OF PUNCHED CARD, PUNCHED TAPE AND COMPUTER EQUIPMENT BY INDUSTRIES NOW IN USE, BASED ON 1863 VALIDATED REPLIES	Punched Card	Punched Tape	Magnetic Tape, Drum or Random Access
Manufacturing (durable goods)	545	121	154
Manufact. (non-durable goods)	239	60	53
Retail-Wholesale Trade	146	11	36
Insurance or Finance	255	16	68
Government	170	29	49
Petroleum	61	11	28
Public Utility	83	4	17
Other	313	61	85

Management Games *(continued from page 19)*

is cautioned not to believe all that a teacher says, or he does not anyway!). Therefore, games should only be used as one part of an overall training program consisting of lectures, demonstrations, etc.

Some of the manual or non-computer games described in the literature so far have been very misleading. These articles have tended to over-simplify the problems of formulating the mathematical model. Simulation models and management games are such a pleasurable way to *"spoon feed"* executives abstract concepts such as the nature and scope of *"simulation"* that management may conclude that games can be easily designed to accomplish any and all training objectives.

Personnel Testing

In the area of personnel evaluation, the use of management games is undoubtedly one of the most controversial uses of simulation. On the other hand, while there are many pitfalls standing in the way of this avenue of development, people are, in fact, being evaluated today by techniques equally crude. One good example of this is the personal interview which has been repudiated many times as an objective evaluation technique under certain circumstances. And yet the personal interview is still being used exclusively for personnel evaluation in many instances. In my opinion, therefore, the use of management games in training and personnel evaluation should be encouraged. No doubt, after much experience has been gained in this field, certain practical uses for games in personnel testing will emerge.

Conclusion

During the past few years, one of the most significant developments in the area of executive development is the increasing use of management games and simulation exercises to accomplish specific training objectives. More and more companies are using inventory control games, production scheduling games, marketing games, and so on, as an integral part of their staff training programs. At the present time most of those industrial games are the manual or non-computer type of simulation exercises. Increasingly, however, companies are viewing their punched card or computer systems as more than simply business data processing installations and are using them for management research and staff training purposes. In the not too distant future it appears that most leading companies will have a repertoire of management games programmed on their data processing equipment for use in training programs in all the important areas of management. ■

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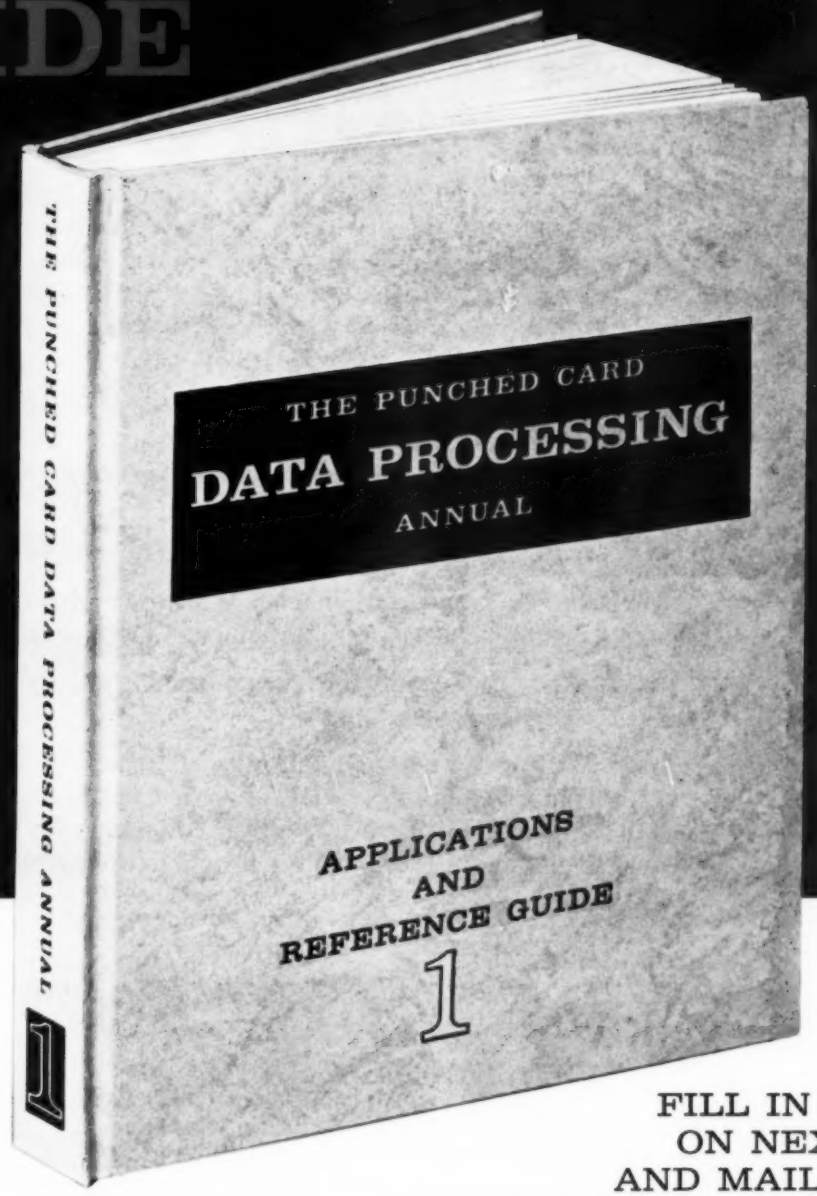

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- Sales Analysis
- Inventory Control
- Accounts Receivable
- Payroll
- Accounts Payable
- General Ledger
- Production Control
- Cost Accounting
- Premium Accounting
- Operations Research
- Other

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COMPUTER NEWS

GENERAL

New applications for IBM 305 Ramac and Tape 650

The M. C. Schrank Company of New Jersey announced the installation of an IBM 305 Ramac. The company, manufacturer of women's woven sleepwear, will utilize the Ramac for *order entry and billing, sales analysis, forecasting, production control and payroll,* among other applications.

Also in New Jersey, Bergen Drug Company, Inc. installed a 305 Ramac, the first installed with double capacity files (10,000,000 characters of storage). Bergen Drug will utilize the system for *billing and inventory control* primarily.

A first for the candy industry will be the New England Confectionery Company's in-line processing system. NECCO will utilize their 305 Ramac system for *order processing and inventory control.*

In Jacksonville, Florida, the Gulf Life Insurance Company installed an IBM Tape 650 system to handle *commission statements and checks* as well as complete *accounting and historical records* for 127,000 policies.

MILITARY

Computers at work for Army, Navy and Air Force

The Tactical Air Command Headquarters located at Langley Air Force Base, Virginia, installed a Burroughs 220 electronic data processing system to process *personnel records, inventory and other accounting data* for TAC as well as higher echelon Air Force authority.

An RCA 501 electronic computer has been installed by the U. S. Navy Bureau of Ordnance to *keep track of all expendable Navy items* such as missiles, torpedoes, etc., on a world-wide basis.

A Univac File-Computer system was inaugurated on Governor's Island, headquarters of the First United States Army. Its initial undertaking will be the processing of *personnel records* of all active and reserve army personnel in First Army's jurisdiction.

Epsco Systems Division delivered a digital data translation system to the Army Ballistics Missile Agency in Huntsville, Alabama. It will *convert output of CEC Millisadic into IBM 704 format.* The Univac 1103 and Datatron, upon expansion of the system, will also be able to utilize its features in the same way.

A Bendix G-15 general purpose computer has been installed at Kirtland Air Force Base, New Mexico and will be used by the Air Force Special Weapons Center's Analysis division to help solve *nuclear energy problems* related to weapons.

The Print Reader MX-2021, developed by the Intelligent Machines Research division of Farrington Manufacturing Company, successfully *"reads" typewritten pages and translates* them into electrical signals at the rate of 200 characters per second. The new machine was developed in conjunction with Air Force scientists at the Intelligence Laboratory, Rome Air Development Center, Griffis Air Force Base, New York.

A $75,000 *research contract* was awarded to Philco Corporation's Government and Industrial division by the USAF Rome Air Development Center.

Research and defense

Another phase of the 450,000 mile *global defense communications* network was put into fully automatic high speed operation. This Pacific phase links the continental system already completed with Honolulu and Fuchu, Japan. The equipment is patterned on the building block principle for future expansion as well as ease of maintenance.

The USAF recovered the second nose cone fired down the missile range in the South Atlantic. A *radio-inertial guidance system,* developed by Bell Telephone Laboratories in conjunction with the Univac division of Remington Rand, was used to guide the missile down-range.

PEOPLE AND PLACES

TMI ACQUIRES SUBSIDIARY

Telemeter Magnetics has purchased 80% of the stock of Digital Instrument Laboratories, Inc., Erwin Tomash, president of TMI, announced. The new subsidiary is engaged in the development and manufacture of electronic products for digital data systems. Products now being marketed include precision variable frequency oscillators, an automatic missile checkout programmer, and a high speed electronic multiplexer.

To meet current expansion needs TMI has leased two modern buildings in Culver City. The present facility in West Los Angeles will be retained by the Components Division for the manufacture of ferrite cores, storage arrays, and electronic components.

MANUFACTURING SERVICES HEAD

International Business Machines Corporation announced the appointment of CHARLES J. LAWSON, Jr., as director of manufacturing services for the corporation. He was previously assistant director.

PAYROLL IN PUERTO RICO

The Commonwealth of Puerto Rico's "Operation Bootstrap" received an electronic assist when Governor Luis Munoz Marin inaugurated an IBM 705 large-scale data processing system.

The first task to be handled by the big commercial computer is the payroll for fifty thousand Commonwealth employees. This will now be completed in a fifth of the time presently required. A group of young Puerto Rican government employees has been trained to operate and program the 705.

ELECTRONICS SPEED SURVEY WORK

Costly survey work for one of the nation's longest man-made lakes has been completed in record time by an electronic hired hand located more than 250 miles away from the $182,000,000 Barkley Dam and lake in western Kentucky.

The J. Stephen Watkins engineering firm of Lexington, Kentucky, retained by the Government to survey land necessary for the huge Barkley Dam reservoir, said its electronic computer solved land acquisition problems during a seven-month period at a saving of about 3000 man hours.

Lyle F. Wolf, engineer in charge of Watkins computer section, said traverse survey work was completed in record time after a Bendix Aviation Corp. G-15 digital computer was put to work in Lexington handling traverse information as it arrived by mail daily from field parties in the reservoir area 250 miles away.

MOORE CORPORATE CHANGES

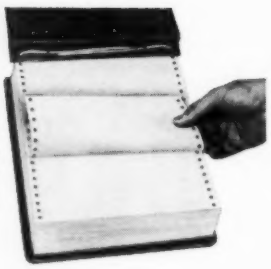
A major addition to its corporate structure and the appointment of Moore executives to new positions have been announced by Thomas Duncanson, President of Moore Business Forms, Inc. He stated, "In order to keep pace with the rapid growth of our national economy, to better serve our customers, and to enable us to concentrate more effectively on our expanding markets, it has been decided to form a new geographic

NEW... NYLON POST BINDER
for marginal punched continuous forms

the "Arlington"
for bursted forms

the "Saratoga"
for unbursted forms

4-inch capacity posts from one *continuous* nylon cord, fully concealed under covers. Individual posts cannot pull out at base.



- Cesco's positive locking system cannot slip
- Smooth covers . . . no protruding posts or catches
- One continuous nylon cord forms both posts
- Binding edges reinforced with steel angles
- Stock sizes available for most sheet sizes

Sheet loading is faster, easier, with continuous posts of flexible nylon.

WRITE TODAY FOR COMPLETE DETAILS
YAWMAN & ERBE MFG. CO., INC.
The C. E. SHEPPARD CO. Division
1088 Jay Street, Rochester 3, New York

Division of Moore Business Forms, Inc., in the midwest."

The new division of the company, to be fully operative January 1, 1961, will be known as the Central Division and will have its headquarters in the Chicago area. Construction of a Home Office building for the division in Park Ridge, Illinois, a Chicago suburb, will be started early in 1960.

In its formative stages, the new division will be under the general supervision of W. L. EGGERT, Vice President and General Manager of Moore's Eastern Division.

The following executive appointments, effective January 1, 1960, have been announced:

DAVID BARR, currently General Sales Manager of Moore's Eastern Division has been appointed as General Manager of the Central Division.

NORMAN CREIGHTON, assistant General Sales Manager, will replace Mr. Barr as General Sales Manager

STANLEY D. WALTMAN, Operating Sales Manager, will become General Sales Manager. MERVYN TAYLOR, assistant Comptroller in Niagara Falls, has been named Comptroller of the new division.

The new General Production Manager for the Central Division will be RICHARD W. HAMILTON, formerly Assistant General Production Manager of Moore's Pacific Division.

ROYAL McBEE

CHARLES W. DOULTON has been named New York District manager of the Data Processing Division of Royal McBee Corporation. He replaces E. H. EDLING who has been New York manager since 1946. Edling will devote all his time to servicing several large accounts in the New York area.

VOGEL NAMED SALES MANAGER AT DIL

O. F. VOGEL, Jr. has joined Digital Instrument Laboratories of East Los Angeles as sales manager. During his more than eight years with his former connection he managed the $3.5 million Project Datum, which included installation of a centralized data processing system at Edwards Air Force Base.

PHILCO PERSONNEL

Philco Corporation has announced the following appointments: L. G. (Jim) BECKER to eastern regional manager for the Government & Industrial division. His headquarters will be in Washington, D. C. Mr. Becker was formerly with the Department of the Air Force as chief, communications - electronics branch, directorate of material programs.

ROBERT E. STEELE is new manager of product planning for Transac computers. He will be responsible for conducting market research and application studies in planning future product requirements for Philco computers, in addition to new developments in the Transac S-2000 electronic data processing system.

ROBERT A. COHEN was appointed to the newly created position of manager-customer information services for the Transac computer department. He came to Philco a year ago as a senior programmer. Mr. Cohen and his staff will be responsible for the collection and dissemination of technical information to customers, prospective customers and Philco personnel.

WILLIAM DOHERTY was promoted to sales manager for Transac computers. He replaces John J. Nisbet who was appointed marketing manager-Transac computers several months ago. Mr. Doherty will be responsible for Philco's nation-wide computer sales program and supervision of all regional sales managers and field representatives. ■

(Another Tab Supervisor has turned to Carditioner)

Unmachinable punched cards used to cause hours of extra work in Mr. Supervisor's department. Some mutilated cards were always missed in visual sorts, increasing jams and causing hard-to-find errors. And it all meant overtime.

Now, a Cummins Carditioner sorts and reconditions 275 cards a minute for normal machine processing—rejects those with staples, tape or folded corners. Jams are cut 75%. Off-punching is prevented. Repunching of substitute cards, and the 6-7% punching errors they introduce, are all but eliminated. Reports balance back to controls easily. Management gets reports on schedule—and, everybody goes home on time!

WRITE FOR FREE BOOKLET TODAY

See how Carditioner pays its own leasing cost with as few as 250 unmachinable cards a week. Detailed case histories available on request.

IN BUSINESS AND BANKS SINCE 1887

Cummins

Cummins-Chicago Corporation

4740 North Ravenswood Avenue, Chicago 40, Illinois

Sales and Service in all Principal Cities

OUTPUTS

ITEMS OF INTEREST FROM HERE AND THERE

MODEL OF U. S. ECONOMY

The Econometric Institute, Inc. highlighted its twenty-first year of forecasting and analysis when it introduced the Institute's electronic model of the United States Economy during a special demonstration held at the Data Processing Center of the Service Bureau Corp., a subsidiary of IBM.

During the demonstration, Peter W. Hoguet, president of the Institute, said, "This is the first time that such quarterly forecasts have been produced on an integrated electronic model of the U. S. Economy. The Service Bureau Corporation's 650 computer makes possible calculations in a relatively short period of time, which formerly required weeks. This new development also means earlier availability to business and finance of expertly processed data and forecasts."

The Institute prepares econometric studies from current, private and public economic and financial data and publishes weekly and monthly forecasts of several industries.

Dr. Colin Clark, Director of Research of the Institute and a renowned international economist, described the use of the model in forecasting. "The Model contains some 80 equations, 29 of which are behavioral and are based on items which the Institute believes are functions of various components of the economy which it forecasts."

NATIONAL INDUSTRIAL CONFERENCE BOARD

With the advent of the modern computer, principal officers of many of the user companies are turning their personal attention to data processing and record keeping for the first time in many years, the National Industrial Conference Board reports in releasing a study of management's role in electronic data processing.

These company presidents, and in some cases, boards of directors, have found they must take an active part in their computer programs because the investment can be substantial, methods of management control can be affected, company policies and practices may need alteration, and organization changes may be required.

FASTER BOUNCE

Automation will speed the bounce of rubber checks, according to the Office Equipment Manufacturers Institute.

That's because magnetically coded checks, which are paving the way for automation of the nation's banking business, will give depositors less time to cover checks they cash out of town against insufficient funds in home banks.

The OEMI reports that the number of individual checks written is staggering: 10 billion last year, or 50 checks for each man, woman and child in the country. And the total grows by another billion a year.

IBM FINANCES

For the six months ended June 30, 1959 net income of the International Business Machines Corporation was $64,030,809 after estimated U. S. federal income taxes, Thomas J. Watson, Jr., president, reported. This is equivalent to $3.51 a share on the 18,247,163 shares outstanding at the end of the period. This compares with net income after taxes for the corresponding 1958 period of $50,597,655, equivalent to $2.78 a share on 18,205,840 shares, the number of shares outstanding June 30, 1958, adjusted for the 2½% stock dividend paid January 28, 1959, and the 50% split-up effected May 5, 1959.

Net income before taxes amounted to $130,706,809, compared to $104,677,255 in the corresponding 1958 period. Gross income from sales, service and rentals in the United States amounted to $615,371,141, compared with $564,615,629 in the corresponding 1958 six-month period.

CLARY SALES

President Hugh L. Clary reported that the January through June sales total was $6,821,000 as compared with $5,695,000 for the same period a year ago. June was one of the best months in the recent history of the corporation with sales of $1,425,000. Reporting on what he termed "an over-all favorable outlook for the last six months of the year," Clary said: "Clary Dynamics, a wholly-owned subsidiary of Clary Corporation, has scheduled deliveries for the last six months nearly twice those for the first six months. Current trends indicate Clary's International Division sales and profits for 1959 will run approximately 20% ahead of 1958."

NCR SALES AND EARNINGS

Both earnings and sales of the National Cash Register Company in the second quarter of 1959 set new records for the period, Stanley C. Allyn, NCR board chairman, announced.

Earnings for the second quarter were $4,418,307, an increase of 23%, or $835,566, over net income for the comparable period of 1958. Sales of all products and services in the second quarter were $102,783,352, a 5% increase over the $97,992,939 reported in the same period of 1958.

Mr. Allyn said the second quarter results were reflected in a new sales high for the first six months of the year. The six-month sales total was $194,700,770, representing an increase of $4,309,190 over the comparable period of 1958, which had been the previous high. Earnings for the six-month period were $8,088,417, a 12% increase over the first half of 1958. The earnings represented $1.08 per share, compared with 96 cents a share for the first half of 1958. Sales of the company's commercial products and services increased $12,567,844 during the first six months of 1959, or 7%.

DATACENTERS

Computers by the hour will be available to businesses across the nation in 1960. International Business Machines Corporation, in a departure from its traditional monthly leasing policy for data processing equipment, announced that its Data Processing Division would establish twenty-five to thirty Datacenters in major cities.

A Wall Street Datacenter will be established in New York City's financial district next March. In April a Chicago Datacenter will be opened and in May a Los Angeles facility.

These metropolitan Datacenters will each house a million dollar IBM 7070 and will be open to all businesses.

Datacenter customers may buy as little as fifteen hours of computing time a month. They will supply their

own programmers (people who develop instructions for computers) and their own operators. The rate for the 7070 systems will be under $300 an hour.

STANDARD REGISTER

Continued increases in volume and profit for second quarter and first half 1959 operations as compared with similar 1958 periods were reported to stockholders of The Standard Register Company by M. A. Spayd, president.

Unaudited figures show that first half 1959 net income, after Federal taxes, rose to $1,929,661, equivalent to $1.94 a share, from the corresponding 1958 period's figures of $804,822, or $.82 a share, an increase of 140%. Net income before Federal taxes amounted to $4,020,127 in first half 1959, compared with $1,676,714 for the similar 1958 period.

Mr. Spayd noted that the 1959 six months' sales volume of $26,747,013 represented a 14.2% increase over the $23,423,578 for the first six months of 1958 and that the 1959 six months' profit of $1,929,661 exceeds the $1,884,299 profit for the entire year 1958.

TRANSACTER SYSTEM

An entirely new electronic system that promises an important "breakthrough" in the march toward industrial automation was announced by John F. Carr, executive vice president and general manager of Stromberg Time Corporation, a subsidiary of General Time Corporation.

Called the Transacter System, the equipment constitutes the first successful development of a completely automatic transaction recording and data communications device. It functions in the pre-input stage of any data processing system, making it possible to collect information at remote sources and feed it instantaneously to central electronic computers.

The first production unit of the Transacter system has been installed at the U. S. Naval Gun Factory in Washington, D. C. where it will be used to feed data information to an IBM 650 computer. Its primary function will be to simplify manufacturing control.

NAME CODE GENERATION

A method utilizing the full economic advantages of electronic data processing to do the complete work of maintaining and processing stockholder records has been successfully developed and proved for the first time in bank-bookwork history, reports the First National Bank of Boston.

The breakthrough in this segment of banking office work was made possible by the creation of an ingenious file-keeping method called "Name Code Generation" by a team of electronics experts at the bank and at Minneapolis-Honeywell.

"Name Code" is a computer-controlled set of electronic signals which allows the machine to assign alpha-numerical "keys" in place of account numbers necessary to stock transfer data handling in vast files, a tricky, tedious business previously requiring a large measure of human judgment and manual work. Until now the automatic assigning of appropriate numbers to accounts of this kind by a computer had appeared insurmountable.

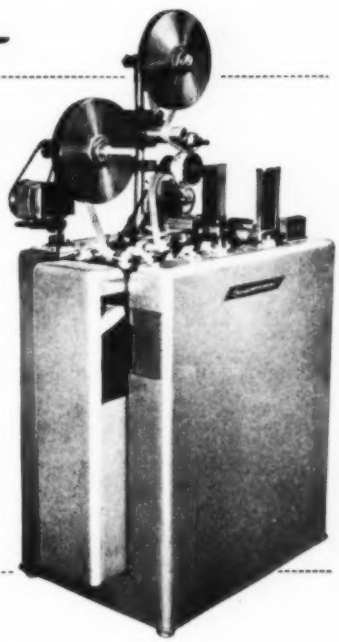
First National Bank reports that when the method is fully applied the computer system will automatically handle the printing and addressing of 8,500,000 envelopes, post cards and stock dividends, 2,500,000 cash dividend checks and 900,000 proxy mailings annually, in addition to doing the daily job of updating the stock transfer records. ■

Scriptomatic®

ULTRA HIGH SPEED TAPE ADDRESSING

- Model 301—30,000 to 40,000 addresses per hour.
- Masters are standard punched cards.
- Prints 5 line addresses on ⅞" tape.
- Standard Model prints addresses to 2½" length and punches holes to standard 2 11/16" centers.
- Continuous loading and unloading of card masters.
- Town marking attachment.
- Dimensions of Model 301—19½" wide, 33" long, 58" high.

Write for Prices and Detailed Bulletin.



A PERFECT MARRIAGE . . .

Punched Card and Scriptomatic Automation

Scriptomatic methods combine all the advantages of punched card automation and conventional addressing equipment. Scriptomatic offers a full range of machines and methods to tie in any punched card system you are using or plan to use. Today you can get all the advantages of a high speed, fully flexible addressing and data writing system . . . at a running cost differential as amazing as the cost comparison between a card and a metal plate. You enjoy not only low first cost but continuing savings in automatic file maintenance, filing space, and elimination of duplicate lists. Scriptomatic is the system geared to tomorrow . . . Imagine your punched card system flowing through a Scriptomatic machine for selective, flexible, high speed addressing.

Write for case studies and descriptive material. Discover now, at no obligation, if Scriptomatic can improve your procedures.

SCRIPTOMATIC, INC.
320 N. 11th Street, Philadelphia 7, Pa.

Scriptomatic
MODERN ADDRESSING-DATA WRITING MACHINES AND METHODS

Circle No. 7 on Reader Service Card.

PRINT FROM CARDS...DOUBLE THE FLEXIBILITY...HALF THE COST

PRODUCTS & SERVICES

VISIBLE RECORD COMPUTER

Burroughs Corporation announced a newly developed solid-state electronic computer data processing system — capable of reading and writing the same language as the human eye can read.

Ray R. Eppert, president, said the Burroughs B251 Visible Record Computer was specifically designed for the banking industry to handle the largest data processing problem in the world. It was demonstrated at a press conference at the firm's Research Center in Paoli, Pa.

The device is named the Visible Record Computer because it selects and writes directly on individual account records. The computer system reads information directly from checks, deposit slips and other documents of varying sizes and thicknesses, processes the information and automatically computes, selects and posts directly to the correct customer's account record.

The system utilizes Magnetic Ink Character Recognition (MICR), the term for numbers that can be read by electronic machines as well as by people which was announced last winter by the American Bankers Association as the "common language" for that industry.

In addition the system will permit banks to use it for checking and saving accounts, installment loans, mortgages and other accounting operations. It will also provide accounting and statistical reports vital to bank management.

Instructions can be given the system to reject checks on which stop payment orders have been placed and refuse payment of checks if an account is overdrawn. It also can accomplish balance transfers, compute and post service charges and accumulate trial balances all at the same time.

The system is simple to operate and requires only one person in attendance. It is capable of performing 4,000 arithmetical functions in a minute. List price is $217,400. It will be leased for $3,975 a month.

ELECTRONIC DATATYPER 410

The same principle which helps guide missiles to their targets is now being applied to the streamlining of business paperwork in a new concept for embossed and coded metal and plastic plates for source data writing systems.

A Servodrive mechanism similar to devices used in advanced navigation activates the embossing head of the Electronic Datatyper 410, introduced by Dashew Business Machines, Inc., 5886 Smiley Drive, Culver City, Calif.

The machine, according to Stanley A. Dashew, president of the manufacturing firm, was developed specifically to meet the needs of businesses and government agencies in the preparation of embossed plates for integrated data processing applications.

In what is believed to be the first application of the electronic Servodrive principle to business machines, the new Datatyper has made a major breakthrough in speed and flexibility. It will operate at an average speed of 14,000 characters per hour in embossing plates for use in credit card plans, industrial payroll and stock control systems and as identification tags.

The electronic drive mechanism is directly responsible for this high speed. The entire operation of the embossing head is electronically controlled and electrically operated. The Servo principle makes it possible to eliminate completely the need for clutches or mechanical drive devices, keeping the service factor at a minimum. Overall noise level is so low that the machine can easily be installed and used in the average office. The electronic controls also make it possible for the new machine to do a highly accurate job of embossing. The Datatyper is believed to be the first machine of its type capable of handling stainless steel plates.

Wide flexibility is offered in programming the machine to produce embossed plates. The carriage can be programmed to enter information in virtually any order. For example, if a punched card were set up so that the name appeared before the account number, the machine would accept the data in this order. The name would be printed on the second line of the credit card. Then, the carriage would position the card so that the account number appeared on the top line.

The machine can also be set up to emboss sequence numbers in plates automatically. It will also duplicate plates in any desired quantities where additional units with the same information are required.

SPECIFICATIONS

INPUT, Data
From IBM 024; tape reader (5-8 channel); or keyboard.

INPUT, Material
All standard metal or plastic plates, including stainless steel, up to 3" x 5", with ⅛" margin on all sides.

OUTPUT
14,000 characters per hour average—either embossed or inverse.

CHARACTER SPACING
Automatic.

DIMENSIONS
33" wide; 51½" long; 53" high.

WEIGHT
Approximately 450 pounds

PRICE
Basic unit, $14,000. Accessories as required.

CARD CODE PUNCH

The new Univac Card Code Punch, designed to extend the capacity of the 90-column alpha-numerical punched card code, has been announced by Remington Rand Division, Sperry Rand Corp.

The new punch extends the 90-column code from 38 combinations—26 alpha, 10 numerical, symbol and space — to 63 combinations or characters. The additional 25 special character codes make the 90-column code equal to the 7-bit binary Univac code in capacity, and make it possible to utilize the full range of characters of a high-speed printer from punched card input.

NEW COMPUTER TYPEWRITER

Added convenience in computer operation is possible with the introduction of a fully alphanumeric typewriter for the Bendix Computer Division's G-15 digital computer. Data entering and leaving the computer via the typewriter can now be identified with alphabetic information and a variety of special symbols. Headings for columnar typeout, as well as complete format control, can be programmed.

All information is typed into the computer in the normal typing manner. Upper and lower case letters, numbers and special symbols are entered and typed out directly, without the necessity for manual encoding of alphabetic data, conversion subroutines or programmed carriage shifts.

The G-15 is now available with a choice of the alphanumeric typewriter or a standard numeric typewriter. Both units utilize a new base configuration which provides maximum reliability. Bendix Computer Division, 6530 Arbor Vitae St., Los Angeles 45, Calif.

CARD HOLDER

This punched card holder, developed at the request of punched card users, has four heavy permanent magnets attached so that it will cling to data processing machines, file cabinets, or any steel surface. Beemak Plastics, 7424 Santa Monica Blvd., Los Angeles 46, Calif.

AIR USED TO BRAKE, GUIDE COMPUTER TAPE

Air is being used as a lubricant to cushion and control the fast-whirling magnetic tapes on the Honeywell 800 computer system.

Firm "fingers" of air pressures and vacuums have replaced mechanical brakes and clutches, used to guide the movement of data-bearing tape through the read-write mechanisms of computers, on the new transistorized computer now under construction at the Datamatic Division of Minneapolis-Honeywell.

S. D. Harper, who is project director on the Honeywell 800, said the new system will virtually eliminate tape damage resulting from internally created dust particles. Microscopic specks of magnetic oxide from the working surfaces and mylar dust from the opposite side formerly were worn off tapes by friction from capstans and "pinch brakes." When these clumps of dust occasionally became embedded in the working surfaces they plagued the industry by affecting tape fidelity.

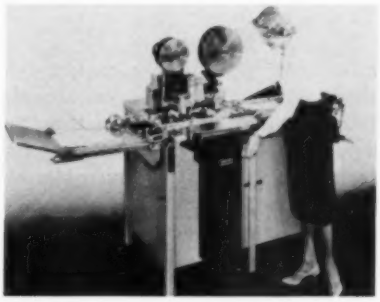
Honeywell's pneumatic techniques, Mr. Harper explained, reduce tape wear and slippage by distributing braking and clutching forces over areas ten times as great as those subjected to mechanical pinching, and add blowing and sucking actions to tape surfaces at the instant of releasing or applying force, thus contributing a cleansing factor.

NEW MODEL ADDRESSING MACHINE

The Model 101-SM Scriptomatic Addressing Machine which prints from punched card masters features a monitor for list testing. The Scriptomatic Monitor is a self-setting counter that permits automatic, high-speed, and mathematically scientific test procedures for list sampling. For example, the Monitor can be set to print every 10th name. Further, it can be set to address every "X" name only in selected categories of the list. If you have categories A, B, C, D (to take another example) you can set the machine to print every 7th name in categories B and D and skip A and C categories.

In addition, the machine electronically "reads" information punched on IBM, Remington Rand, or other punched card systems to selectively print, sort and count simultaneously without disturbing file sequence. Thus, in a single automatic run, you get complete list handling flexibility and addressing selectivity at high speed.

According to requirements, sorting and collating through punched card equipment is also possible. Scriptomatic, Inc., 1105 Vine Street, Philadelphia 7, Pa.



GLP AND FILMSORT TO MARKET NEW AUTOMATED DATA RETRIEVAL SYSTEM

Agreements to manufacture and market a new electronic system for automated data retrieval were announced by General Precision Laboratory, Inc. of Pleasantville, N. Y., a subsidiary of General Precision Equipment Corporation, and The Filmsort Co. of Pearl River, N. Y., division of Miehle-Goss-Dexter, Inc.

Developed by GPL, the system operates within seconds after dialing a code number on a telephone-type device to select one file card out of thousands or millions. The automatic equipment can be activated by punched cards, or punched or magnetic tape as well as by electronic dialing.

According to GPL and Filmsort, the system provides industry, financial institutions and the government with a completely mechanized means of retrieving and examining filed records of all types. It will save engineering, accounting, and office personnel untold hours of costly manual searching for and refiling of reports, ledger sheets, drawings, patents, and other vital documents.

To extend the capabilities of the equipment, closed-circuit television is combined with the electronic retrieval gear to transmit a high resolution image of the dialed record to a TV screen at the executive's desk. With this arrangement, *telecard*, the file documents can be viewed simultaneously by any number of persons at various locations nearby or remote from the files.

In addition, Filmsort aperture cards with microfilm inserts increase the data storage capacity of the remote control filing system to transmit records as large as 36 by 48 inches. The ability of the GPL television equipment to reproduce small characters with great clarity for the first time makes practical the direct TV reading of microfilm copy.

Besides selection and TV transmission of records, the system can automatically remove such records from the files and position them in devices to print back the desired information from either microfilm or standard cards. Other techniques permit the viewer operator, located far away from the centralized files, to update the posted data on the selected card and return it to its proper file position.

DUPLEX TAPE INPUT UNIT

A "piggy back" paper unit which allows the Burroughs E101 electronic computer to accept data and instructions from either one of two readers has been announced by Burroughs Corporation's ElectroData Division. Coupled with the standard Model A531 input unit, it increases the E101's versatility by providing the programmer with completely automatic control of two separate tapes.

Control of the new unit is provided by the desk-size computer's pinboard programming unit.

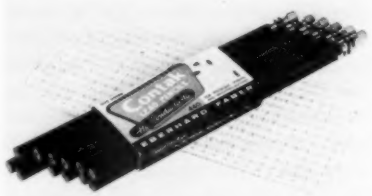
Purchase price of the new Duplex tape unit is $2,375; monthly rental is $65.00. Delivery is quoted as three months after receipt of the order.

NYLON POST BINDERS

Nylon post binders for fast, easy filing of unburst or burst control punched forms are now available from UARCO Inc. The new binders eliminate the shortcomings of conventional type binders and reduce both forms and storage expense. Pages held in the binders are completely exposed for easy reference. Thus, the entire form may be filled with type matter resulting in fewer pages for reports, and a consequent savings in forms cost.

There are no protruding parts on the outside of covers to interfere with neat, flat stacking. Result is less storage space used than with old style post binders. Flexible nylon posts lock with one motion, and are as easily released for the addition of new pages. The binders are available in a wide range of sizes with permanent or flexible covers.

An illustrated brochure may be obtained from local UARCO representatives, or by writing UARCO Inc., 300 West Congress Parkway, Chicago 7, Ill.



MARK SENSING PENCIL

Adding to its line of reproducing and non-reproducing writing instruments, the Eberhard Faber Pencil Company, Crestwood, Wilkes-Barre, Pa., has introduced #440, a Contak Hi-Conductivity Lead Pencil. This new product is specially designed for use on electronic mark sensing and test scoring tabulating machines, thus eliminating the need for punching. This is especially valuable for processing field reports.

PROGRAMMATIC ADD-PRINT PUNCH

Clary Corp. has introduced a new programmatic add-print tape punch (lower unit in photo) which offers a choice of four inputs for eliminating repetitive manual operations in data processing. These optional inputs include, left to right, a full keyboard adding machine, a form printer for applications requiring

individual hard-copy documents such as receipts, and a ten-key adding machine. In addition, it may be used directly with instrumentation devices.

NEW COMPUTER TAPE

A new magnetic tape, especially designed for computer use, has just been introduced by Ampex Corp., Redwood City, Calif. Called Ampex C-1, this new product answers the special need of digital systems for a tape which has long life and, at the same time, high magnetic properties.

Ampex has achieved long tape life with smooth, dense tape coating. Direct head-to-oxide contact is thereby assured and optimum tape performance attained because output is not compromised.

Ampex C-1 makes use of the Ferrosheen process to provide the lowest coefficient of friction of any magnetic tape. This tape can ride directly against recording heads, pass after pass, without undue wear. Tests show a wearing quality for Ampex C-1 ten times greater than any tape of comparable magnetic properties.

Computer operators who fight humidity problems will find another advantage in this unusual new tape. Completely moisture-resistant, Ampex computer tape shows no change in performance, even in relative humidities up to 100%.

HIGH-SPEED MESA TRANSISTORS

Two new low cost Mesa transistors (RCA-2N1300 and 2N1301) for high-speed switching in electronic computers were announced by the RCA Semiconductor and Materials Division, Camden 2, N. J.

"RCA expects that the new transistors will become key components for high-speed military and commercial data processing equipment in the very near future," said F. F. Neuner, Manager of the division's Marketing Department.

The term "Mesa" describes the portion of the germanium in the transistor which remains after the etching process. These portions resemble the flat-topped Mesa hills with steep sloping sides, common in the southwestern United States.

PAPER TAPE PROGRAMMER

A militarized perforated tape programmer, Model 3277, is now supplied by the Potter Instrument Company, Plainview, N. Y. for use in military check-out systems. Designed and built to conform to MIL-E-16400, the programmer features bi-directional drive, character reading rates up to 200 per second, tape widths up to one inch, and self-contained electronics for control and data playback. Over 500 feet of sandwich mylar tape can be accommodated by the self-contained 6" reels, or 300 feet of paper tape. Some variations in characteristics are possible to suit specific system requirements, such as high reading rates and modified output signals.

■ ■ ■

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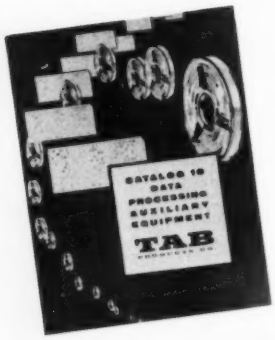

THE TAB PRODUCTS CO.'s 80-page catalog of auxiliary equipment for data processing departments shows a very complete line of auxiliary equipment. It has been broadened to meet today's expanding needs in data processing, according to Harry W. LeClaire, Tab president. The catalog, illustrated with 227 photographs, is organized for easy reference into separate sections for card filing, card handling, control panel storage, and tape handling equipment.

Available nationally, Catalog 10 may be obtained from local Tab representatives or from Tab head offices at 995 Market Street, San Francisco 3, California.

BENDIX G-15 digital computer is described in a new, 6-page illustrated bulletin, with particular emphasis on the magazine-loaded photo tape reader which is offered as standard equipment. Also included are descriptions of POGO and INTERCOM 1000 programming systems; accessory punched card, magnetic tape and paper tape equipment; several special purpose devices and G-15 specifications. Copies will be mailed on request. Bendix Computer Division, 5630 Arbor Vitae St., Los Angeles 45, Calif.

MAGNETIC HEADS, precision tape and drum, ranging from one to sixty-four channels, are described in an 8-page comprehensive brochure containing photographs, typical specifications, and graphs of performance characteristics. Write: J. B. Rea Co., Electronics Division, 2202 Broadway, Santa Monica, Calif.

PCDP BOOK SHELF

SYSTEMS AND PROCEDURES RESPONSIBILITY by Philip H. Thurston, Division of Research, Graduate School of Business Administration, Harvard University, Soldiers Field, Boston, Mass., 1959, 110 pages, $2.50.

This volume is the result of the author's research into systems concerned with electronic data processing installations. The first chapter outlines the scope of the study and provides basic definitions. Chapters Two to Four are concerned with systems planned and installed by specialists, operating people, planned by specialists and installed by operating people respectively. Chapter Five deals exclusively with shared responsibility for planning and installation. Chapter Six, conclusion, assays the results of the findings of the prior chapters.

PROFESSIONAL PRACTICES IN MANAGEMENT CONSULTING by Association of Consulting Management Engineers, Inc., 347 Madison Ave., New York 17, N. Y., 1959, 96 pages, $2.75.

This almost pocket-sized book lists and explains in detail exactly how professional management consultants should conduct themselves as well as direct their operations. More than anything else perhaps, users of such professional services or those considering availing themselves of these services should read this book as a primer to investigating this highly specialized field. The authors are themselves partners or members of management consulting firms. They are experienced in this field and their firms are among the most renowned of all businesses. This book will explain exactly what a qualified management consultant should or should not do.

PROGRAMMING BUSINESS COMPUTERS by Daniel D. McCracken, Harold Weiss and Tsai-Hwa Lee, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1959, 510 pages, $10.25.

The authors, eminently qualified, have written this volume for the average reader who is in daily contact with electronic data processing yet does not possess a mathematical and/or technical background. It is for the business executive whose main interest and background are in management. It ranges the field from survey analysis to coding for electronic processing. The authors incorporated basic features of the various available computers into a hypothetical computer called DATAC. Once the reader grasps the principles of DATAC, he can then easily understand his own particular computer. A special feature are the exercises which follow each chapter. These enable the reader to test his validity of comprehension as he progresses. Lastly, of importance to men of finance, is a series of explanations of controls and audit checks in a computerized application.

DYNAMIC MANAGEMENT DECISION GAMES by Jay R. Greene and Roger L. Sisson, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1959, 84 pages, $2.95.

It is particularly significant that such a publication should be forthcoming at this time. There are seven different management games which can be played and scored without the aid of computers for scoring or evaluating. Aside from the "do-it-yourself" opportunities, the best single portion of the book is the introduction. The authors express in a concise manner exactly what, how and why "gaming" is such a valuable management tool. Their basic comparisons enable the most unsophisticated of us to realize the answers to the what, how and why. It can be safely said that with active participation in the games presented, the reader can develop as well as sharpen his own prowess in business acumen and so be a more valuable individual to his organization. ■

Observations from the publisher

(continued from page 1)

on magnetic tape equipment and failure to give adequate attention to the user whose needs are currently limited mainly to punched card equipment. While they want basic information on new developments in large high-speed equipment for the future, they want help in improving their present methods.

These are all important areas for consideration.

While recognizing that there are formidable problems associated with filling these needs and that the actual results will come from action of the manufacturers, suppliers, associations and educational institutions, *there is much that the individual user can do.* He can continue to *express himself* as so many have done in this survey — and his opinion combined with others sharing his view cannot fail to arouse those responsible for taking the necessary action. ■

Announcement . . .

Punched Card

DATA PROCESSING

to be issued

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Starting with the Jan. 1960 issue

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EDITORIAL

Make That Decision Now!

"The road that stretches before the feet of a man is a challenge to his heart long before it tests the strength of his legs."

THIS FOUR-HUNDRED-YEAR-OLD MOUTHFUL is an appropriate thought for many punched card experts who are assigned to investigate the advisability of converting from a punched card system to a random access or a medium-size computer system. They'll never admit it and they probably don't realize it, but they're scared — afraid to make the big change.

The drawn-out studies that take years to complete are really no more involved than conversions from manual systems to punched card systems. Within a year these over-cautious and therefore over-expensive studies will be looked back upon with embarrassment.

Conversions from punched card systems to random access systems can be accomplished in about four to six months from the beginning of the procedure analysis to the installation of the computer with programs tested and the old and new systems operating in parallel. This can and often has been accomplished by teams of two or three qualified people.

For many long years, punched card champs have been crying the blues about the opposition that they have met with punched card systems. Now some of them can crook that accusing index finger until it points to themselves. They justify their decision by proving that although the random access or medium-size computer doesn't cost more, it doesn't save money — so why change. Look at all they'd have to learn!

The chances are that if they consider the scheduling benefits and the increased frequency of inventory, sales and production analysis reports they'll come out ahead. Solution to overtime and peak load problems and daily rather than monthly reports are within their grasp. If this sounds like an old refrain that has been repeated by installers of punched card systems for years and which has been revived again by the computer boys it's for good reason — it's true!

How many punched card installations are there where clerical cost reductions can be proven? In many cases the benefits lie in improved handling of peak loads, supplying accurate inventory control information or converting from post billing to prebilling. Random access and medium-sized computers provide the opportunity to further improve on these conditions by getting rid of the tub file picking or key punching bottleneck, reducing the back order problem and, in general, providing better customer service.

This new challenge that punched card men face is gradually separating the men from the boys. Remember how the same kind of decisions had to be made when more versatile and higher speed tabulators were made available? Of course, they cost more but look at how they increased the productive output of an operator. Many are still struggling with this high speed vs. slow speed conventional equipment decision while those who have made it are moving toward more important decisions — and more important positions of respect and responsibility. ■

By Eugene F. Murphy

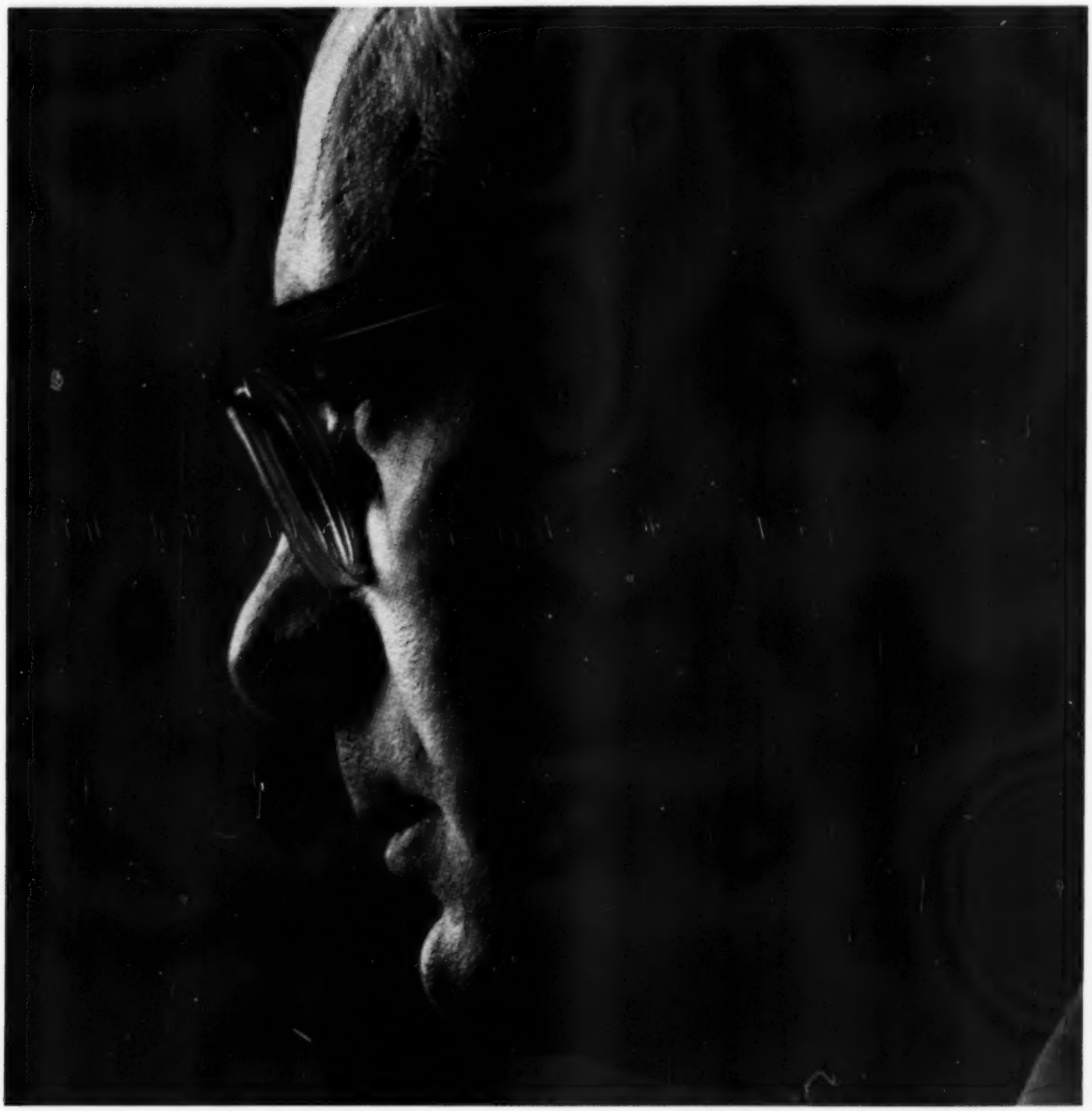
"THE PROGRAMMING FIELD is on the verge of tremendous changes. If we consider the developments in programming techniques and computer hardware that are currently in progress, these alone are enough to make one pause. Added to this are the new uses to which digital computers are being put, such as in management and process control systems. These new uses have created classes of problems for which we do not even have an adequate language to formulate the problems.

"We at SDC are aware of these imminent changes and are preparing for them by extensive activity in pure and applied research in computer programming. Realizing that a large computer based system consists of many integrated components, we are also undertaking interdisciplinary research among such diverse fields as computer programming, electrical engineering, psychology, and operations research.

"If you are a senior member of the programming profession and would like to participate in advanced research projects, you are invited to contact Mr. William Keefer at System Development Corporation, 2447 Colorado Ave., Santa Monica, Calif."

Robert Bosak

Robert Bosak, Head, Data Processing Research Staff



Robert Bosak, *Head, Data Processing Research Staff*

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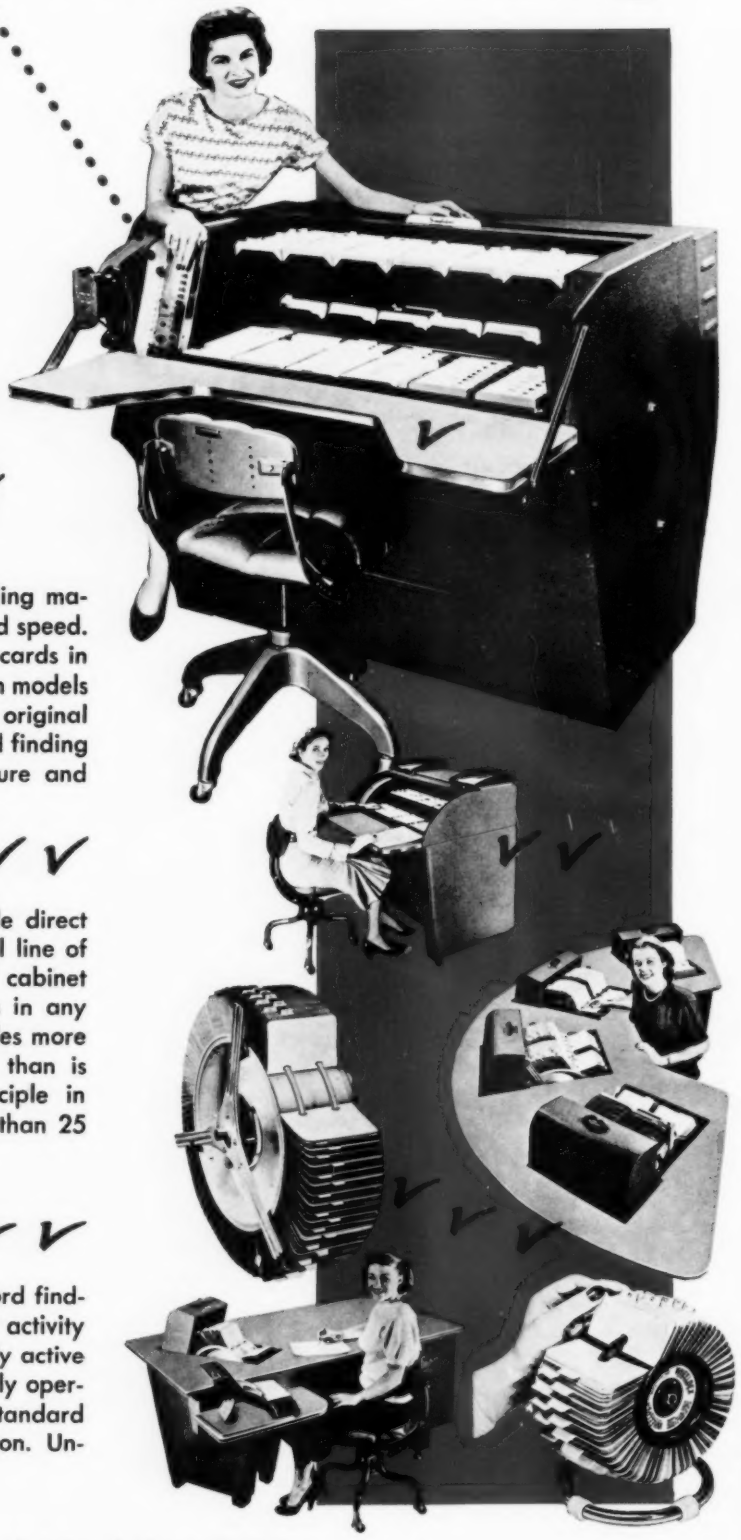

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